Physical
Sci. Lib.

TC
824
C2
A2
no. 153:
65

U.C.D. LIBRARY
DAVIS

C2
AR
#153-65

State of California

THE RESOURCES AGENCY

Department of Water Resources

BULLETIN NO. 153-65

ALLOCATIONS OF COSTS AMONG PURPOSES OF THE CALIFORNIA STATE WATER PROJECT

UNIVERSITY OF CALIFORNIA
DAVIS
FEB 11 1965
LIBRARY

JANUARY 1965

HUGO FISHER
Administrator
The Resources Agency

EDMUND G. BROWN
Governor
State of California

WILLIAM E. WARNE
Director
Department of Water Resources

State of California

THE RESOURCES AGENCY

Department of Water Resources

BULLETIN NO. 153-65

ALLOCATIONS OF COSTS AMONG PURPOSES OF THE CALIFORNIA STATE WATER PROJECT

JANUARY 1965

LIBRARY
UNIVERSITY OF CALIFORNIA
DAVIS

HUGO FISHER
Administrator
The Resources Agency

EDMUND G. BROWN
Governor
State of California

WILLIAM E. WARNE
Director
Department of Water Resources

U.C.D. LIBRARY

TABLE OF CONTENTS

	Page
LETTER OF TRANSMITTAL	xi
ORGANIZATION, DEPARTMENT OF WATER RESOURCES	xiii
ORGANIZATION, CALIFORNIA WATER COMMISSION	xv
PREFACE	xvii
CHAPTER I. SUMMARY AND PROJECTED EFFECT OF COST ALLOCATION	1
Cost Allocations	3
Nonreimbursable Project Costs	6
Appropriations for Nonreimbursable Costs	8
Recommended 1965-66 Appropriations	10
Charges to Water Supply Contractors	10
CHAPTER II. INTRODUCTION	13
Existing Legislation	15
Future Legislation	16
Schedule for Cost Allocation	19
Objectives and Organization of Report	21
CHAPTER III. CONTRACT PROVISIONS AND GENERAL CRITERIA FOR ALLOCATIONS OF PROJECT COSTS	23
Provisions of Water Supply Contracts	23
General Criteria for Cost Allocations	26
Method of Allocating Costs of Project Conservation Facilities Below the Delta	27
Method of Allocating Costs of Project Transportation Facilities	27

Page

Facilities to be Covered by Cost Allocations . . . 28

Time of Initial Allocation 30

Form of Results 30

Application of Results to Water Supply Charges . . 30

CHAPTER IV. COST ALLOCATION METHODS AND PROCEDURES 33

General Considerations 34

Assignment of Costs Attributable to Each Purpose . 34

Allocation of Remaining Joint Costs 35

Cost Allocation Methods for the State Water Project . . 36

Separable Costs Remaining Benefits Method 37

Alternative Justifiable Expenditure Method 39

Proportionate Use of Facilities Method 39

Procedure for Computing Items Involved in Cost Allocations 40

Accounting for Interest 40

Interest Rate 42

Period of Analysis 42

Project Costs 43

Project Benefits 44

Water Supply 44

Recreation and Fish and Wildlife Enhancement. 46

Flood Control 51

Power Generation 51

Other Project Purposes 52

Page

CHAPTER V. COST ALLOCATION FOR COMPLETED FACILITIES 53

Upper Feather Division-Frenchman Unit 53

Benefits 56

Water Supply 57

Recreation and Fish and Wildlife Enhancement. . 58

Project Costs 60

Cost Allocation 61

Upper Feather Division-Antelope Valley Unit 63

CHAPTER VI. COST ALLOCATIONS FOR FACILITIES CURRENTLY UNDER CONSTRUCTION 65

Upper Feather Division - Grizzly Valley Unit 65

Benefits 66

Water Supply 67

Recreation and Fish and Wildlife Enhancement . 68

Project Costs 69

Cost Allocation 71

Oroville Division 75

Benefits 77

Flood Control 77

Power Generation 79

Water Supply 81

Project Costs 83

Cost Allocation 85

Page

California Aqueduct 88

Benefits 93

Water Supply 93

Recreation and Fish and Wildlife Enhancement . 94

Project Costs 98

Cost Allocation 100

CHAPTER VII. COST ALLOCATIONS FOR FACILITIES WITH INITIAL CONSTRUCTION IN 1965-66 107

South Bay Aqueduct 107

Benefits 112

Flood Control 112

Water Supply 113

Recreation and Fish and Wildlife Enhancement . 113

Project Costs 113

Cost Allocation 115

TABLES

Table Number		Page
1	Summary of Results of Cost Allocations	4
2	Estimated Capital Costs of Features Allocable to Nonreimbursable Purposes	7
3	Estimated Capital Costs of Specific Features for Recreation and Fish and Wildlife Enhancement	9
4	Schedule for Completion of Cost Allocation Reports	20
5	Components of the State Water Project to be covered by Cost Allocations	29
6	Current Schedule for Completion of Planning and Constructing Specific Recreation and Fish and Wildlife Enhancement Facilities	50
7	Water Supply Benefits of the Frenchman Unit	58
8	Visitor Use of the Frenchman Unit for Recreation and Fish and Wildlife	59
9	Recreation and Fish and Wildlife Enhancement Benefits of the Frenchman Unit	60
10	Project Costs of the Frenchman Unit	61
11	Cost Allocation of the Frenchman Unit	62
12	Water Supply Benefits of the Grizzly Valley Unit	68
13	Recreation and Fish and Wildlife Enhancement Benefits of the Grizzly Valley Unit	69
14	Project Costs of the Grizzly Valley Unit	70
15	Cost Allocation for the Grizzly Valley Unit	73
16	Estimated Flood Control Benefits of the Oroville Division	79
17	Power Generation Benefits of the Oroville Division	81
18	Project Costs of Oroville Division	84

TABLES
(continued)

Table Number		Page
19	Cost Allocation for the Oroville Division	87
20	Illustrative Total Water Supply Benefits From Facilities of State Water Project Except the Upper Feather Division	95
21	Illustrative Derivation of California Aqueduct Share of Total State Water Project Water Supply Benefits	97
22	Illustrative Recreation and Fish and Wildlife Benefits from California Aqueduct	99
23	Illustrative Project Costs of California Aqueduct	101
24	Illustrative Cost Allocation for California Aqueduct - Delta to Mile 18 Pumping Plant	103
25	Illustrative Cost Allocation for California Aqueduct - Mile 18 Pumping Plant to Termini	105
26	Flood Control Benefits from Del Valle Dam and Reservoir	112
27	Project Costs of Del Valle Dam and Reservoir	114
28	Cost Allocation for Del Valle Dam and Reservoir	116

PLATES

All plates are bound at the end of the report.

Plate Number	
1	Location of Facilities - The California State Water Project
2	Recreation Land Use Plan - Upper Feather Division Frenchman Unit
3	Recreation Land Use Plan - Upper Feather Division Antelope Valley Unit
4	Recreation Land Use Plan - Upper Feather Division Grizzly Valley Unit
5	Recreation Land Use Plan - Oroville Division Oroville Reservoir and Afterbay
6	Recreation Land Use Plan - San Luis Reservoir and Forebay
7	Recreation Land Use Plan - East Branch Division Cedar Springs Reservoir
8	Recreation Land Use Plan - East Branch Division Perris Reservoir
9	Recreation Land Use Plan - West Branch Division Castaic Reservoir
10	Recreation Land Use Plan - South Bay Aqueduct Del Valle Reservoir

OF CALIFORNIA—RESOURCES AGENCY

WILLIAM E. WARNE, *Director*

ARTMENT OF WATER RESOURCES

OX 388

MENTO

January 4, 1965

Honorable Edmund G. Brown, Governor
and Members of the Legislature
of the State of California

Gentlemen:

I have the honor to transmit herewith Bulletin No. 153-65, entitled "Allocations of Costs Among Purposes of the California State Water Project". This report comprises a progress statement by the Department of Water Resources in its development of official allocations of project costs among those purposes which are reimbursable by project water and power users and those purposes which are nonreimbursable by such users. The report is for the information of the State Legislature, the California Water Resources Development Finance Committee, the water supply contractors of the project, and the public.

This report is the first of an annual series which will continue, as required, until the allocations of costs among all purposes and for all facilities of the California State Water Project have been completed.

Sincerely yours,

William E. Warne

Director

STATE OF CALIFORNIA
THE RESOURCES AGENCY OF CALIFORNIA
EDMUND G. BROWN, Governor
HUGO FISHER, Administrator, The Resources Agency of California

DEPARTMENT OF WATER RESOURCES
WILLIAM E. WARNE, Director

B. ABBOTT GOLDBERG, Chief Deputy Director
REGINALD C. PRICE, Deputy Director Policy
NEELY GARDNER, Deputy Director Administration
ALFRED R. GOLZE', Chief Engineer

UTILITY COMMITTEE
William E. Warne, Chairman

B. Abbott Goldberg
Reginald C. Price
Neely Gardner
Alfred R. Golze'
Robin R. Reynolds
John E. Hunt
Donald A. Sandison
John M. Haley
J. K. Cummings
Helen T. Moss, Secretary

DIVISION OF OPERATIONS

This report was prepared under the direction of

Robin R. Reynolds . . . . . Division Engineer

by

Wayne MacRostie . . . . . Chief, Contracts and Repayment Branch
John R. Eaton . . . . . Chief, Project Analysis Section

Assisted by

Lloyd B. Shinn. . . . . .Senior Economist
Phillip E. Benjamin, Jr. . . . . Associate Economist

AREA MANAGEMENT

Estimates of benefits and specific costs
were prepared under the direction of

John M. Haley . . . . . Acting Assistant Chief Engineer
Charles A. McCullough . . . . . .Chief, Bay Area Branch
Carl A. Werner. . . . . Chief, Delta Branch
Carl L. Stetson . . . . . Chief, San Joaquin Valley Branch
James J. Doody. . . District Engineer, Southern California District

DIVISION OF DESIGN AND CONSTRUCTION

Estimates of capital costs
were primarily prepared under the direction of

Haywood G. Dewey, Jr. . . . . Division Engineer

Studies concerning the enhancement
of fish and wildlife were prepared by

DEPARTMENT OF FISH AND GAME
Walter T. Shannon, Director

Studies concerning public recreational use
were prepared by

DEPARTMENT OF PARKS AND RECREATION
Charles A. DeTurk, Director

CALIFORNIA WATER COMMISSION

RALPH M. BRODY, Chairman, Fresno

WILLIAM H. JENNINGS, Vice Chairman, La Mesa

JOHN W. BRYANT, Riverside

JOHN P. BUNKER, Gustine

IRA J. CHRISMAN, Visalia

EDWIN KOSTER, Grass Valley

JOHN J. KING, Petaluma

NORRIS POULSON, La Jolla

MARION R. WALKER, Ventura

- - - - - -

WILLIAM M. CARAH
Executive Secretary

OROVILLE L. ABBOTT
Engineer

THE CALIFORNIA
STATE WATER PROJECT
CRESCENT CITY
UPPER EEL RIVER
DEVELOPMENT
WATER
SERVICE
AREA
UPPER FEATHER
DIVISION
OROVILLE
OROVILLE DIVISION
SACRAMENTO
NORTH BAY AQUEDUCT
DELTA FACILITIES
SAN FRANCISCO
SOUTH BAY AQUEDUCT
DEL VALLE RESERVOIR
CALIFORNIA
SAN LUIS RESERVOIR
COASTAL DIVISION
WATER
SERVICE
AREAS
AQUEDUCT
CASTAIC RESERVOIR
CEDAR SPRINGS RESERVOIR
LOS ANGELES
PERRIS RESERVOIR
SAN DIEGO

PREFACE

This report is the first in an annual series on the allocation of costs of the California State Water Project among project purposes. It is intended to be an initial progress report in this important area of financial management.

The scope of project service and the sizing of facilities basic to this report are contained in the Department's Bulletin No. 132-64, "The California State Water Project in 1964", released in June 1964. The project description in that bulletin is to a certain extent out-of-date. Important changes are (1) the completion of the water contracting program on September 30, 1964 and the associated increase in the minimum project yield from 4,000,000 to 4,230,000 acre-feet annually, and (2) the recent decisions to construct the West Branch Division on the Piru Creek Route rather than the Elizabeth Lake Canyon Route and to provide Pyramid Reservoir in that division.

This report covers only the allocation of costs among special project purposes as distinguished from the subsequent distribution of costs allocated to reimbursable purposes among the water supply contractors. Criteria for the distribution of these costs among contractors are specified in the water supply contracts. The distribution of these costs is shown in detail in the annual issues of the Bulletin No. 132 series.

The annual series, of which this report is the prototype, will continue as required until the allocations for all facilities of the California State Water Project have been completed.

CHAPTER I. SUMMARY AND PROJECTED EFFECT OF COST ALLOCATION

The State Water Project, being financed and constructed as a part of the State Water Resources Development System under the Central Valley Project and Burns-Porter Acts, will accomplish a number of purposes. Chief among these are water supply, flood control, hydroelectric power generation, water quality control, recreation and fish and wildlife enhancement. The Department's water supply contracts with 30 public agencies provide that such contractors will pay those costs of the project conservation and transportation facilities which are reimbursable, as determined by the State. Of the foregoing purposes, flood control is considered a federal responsibility and costs of the State Water Project allocated to that purpose will be contributed by the United States. Under the Davis-Dolwig Act, costs allocated to the purposes of recreation and fish and wildlife enhancement are declared to be nonreimbursable by the water supply contractors and to be repayable from the General Fund of the State. Water supply and hydroelectric power generation costs are reimbursable by the project contractors.

The following chapters of this report develop in detail the allocations to be used with costs of components of the Project that will be completed or under construction in fiscal year 1965-66 to compute the costs that will be reimbursable and those that will be nonreimbursable. The provisions of the water supply contracts and procedures of the Department, that govern the cost allocations, are summarized in those chapters.

Three methods were used to make these cost allocations; the Separable Costs-Remaining Benefits Method, the Alternative Justifiable Expenditure Method, and the Proportionate Use of Facilities Method.[1/] These methods have been recognized for some years in cost allocation practice by federal and other agencies. Since 1956, the Separable Costs-Remaining Benefits Method has been recognized by the Department in formal appearances before congressional committees and in other connections. The ways in which the principles underlying these methods were applied in this report are described in the chapters which follow. A fundamental element of the procedures was the utilization of federal cost allocations for facilities involving flood control.

The cost allocations presented herein, as noted, are for those facilities of the State Water Project which are completed, under construction or on which construction is scheduled to commence during fiscal year 1965-66. Six components of the State Water Project, involving units in all major subdivisions of the project except the North Bay Aqueduct, the Delta Facilities, the Upper Eel River Development, and the San Joaquin Drainage Facilities are covered by these allocations.

The remainder of this chapter summarizes the allocations of costs among project purposes, applies these to estimated costs of the State Water Project and recommends an appropriation by the Legislature for 1965-66 to reimburse the

---

1/ These methods are described in Chapter IV.

Department for expenditures for costs allocated to recreation and fish and wildlife enhancement. A general comment as to the effects of the allocations on charges to water supply contractors is made.

Cost Allocations

The cost allocations were determined as percentages applicable to the costs of those portions of multiple-purpose facilities which are jointly used for project purposes, such as dams and reservoirs. The costs to be allocated to each purpose will be determined annually by applying the respective percentages to the actual capital and minimum annual operating costs[2/] incurred for such portions of each multiple-purpose facility. Added to these allocated costs will be costs specifically incurred for the various purposes, such as costs of constructing and maintaining picnic facilities and boat ramps for recreation uses, and an annually determined share of any operating costs[2/] which may be incurred.

The allocations for the multiple-purpose facilities covered in this initial report are summarized in Table 1. As indicated in that table, the percentage values for the California Aqueduct are for illustrative purposes only. This is because much of the data for that facility are preliminary.

2/ Under the water supply contracts, minimum operating costs are those that do not depend upon amounts of water delivered, while variable operating costs are those that are dependent upon and vary with amounts of water delivered.

TABLE 1

SUMMARY OF RESULTS OF COST ALLOCATIONS
(in percent)

Facilities covered in this report	Reimbursable purposes			Nonreimbursable purposes			
	Water supply	Power generation	Total	Flood control	Recreation and fish and wildlife enhancement	Total	Total
			Capital Costs of Features Jointly Used				
Project Conservation Facilities							
Upper Feather Division:							
Frenchman Unit	50.0	0	50.0	0	50.0	50.0	100.0
Antelope Valley Unit	0	0	0	0	100.0	100.0	100.0
Grizzly Valley Unit	5.1	0	5.1	0	94.9	94.9	100.0
Oroville Division, excluding Oroville-Thermalito Power Facilities	54.0	24.7	78.7	21.3	0	21.3	100.0
California Aqueduct*	95.6	0	95.6	0	4.4	4.4	100.0
Project Transportation Facilities							
California Aqueduct,* excluding Coastal Division	97.4	0	97.4	0	2.6	2.6	100.0
South Bay Aqueduct:							
Del Valle Dam & Reservoir	39.1	0	39.1	32.9	28.0	60.9	100.0

* Illustrative percentages only

TABLE 1
(continued)

SUMMARY OF RESULTS OF COST ALLOCATIONS
(in percent)

Facilities covered in this report	Reimbursable purposes			Nonreimbursable purposes			Total
	Water supply	Power generation	Total	Flood control	Recreation and fish and Wildlife enhancement	Total	
Minimum Operating Costs of Features Jointly Used							
Project Conservation Facilities							
Upper Feather Division:							
Frenchman Unit	50.0	0	50.0	0	50.0	50.0	100.0
Antelope Valley Unit	0	0	0	0	100.0	100.0	100.0
Grizzly Valley Unit	8.8	0	8.8	0	91.2	91.2	100.0
Oroville Division, excluding Oroville Thermalito Power Facilities	42.5	41.0	83.5	16.5	0	16.5	100.0
California Aqueduct*	92.0	0	92.0	0	8.0	8.0	100.0
Project Transportation Facilities							
California Aqueduct,* excluding Coastal Division	90.3	0	90.3	0	9.7	9.7	100.0
South Bay Aqueduct:							
Del Valle Dam & Reservoir	14.6	0	14.6	11.4	74.0	85.4	100.0

* Illustrative percentages only.

Nonreimbursable Project Costs

The probable magnitude of costs of the State Water Project which will be nonreimbursable by water supply contractors may be estimated, recognizing that such forecasts can only be tentative at this time.

Table 2 presents first the results of applying the percentages for nonreimbursable purposes in Table 1 to the capital costs of the corresponding components of the State Water Project. The capital costs allocated, shown in Column 1 of Table 2, were taken from "Bulletin No. 132-64, The California State Water Project in 1964", the latest official analysis of the project. The resulting values in columns 2 and 3 of Table 2 are the costs of only those features of the respective facilities jointly used by project purposes, which are allocated to the nonreimbursable purposes of flood control and of recreation and fish and wildlife enhancement. The estimated total capital costs allocated to these purposes are $72,510,000 and $48,084,000, respectively. Column 4 presents estimates of the costs of initial facilities required specifically for recreation and fish and wildlife enhancement, totalling $62,313,000. These initial facilities would be to accommodate projected visitor use for the first 10 years of development. The next two columns indicate that nonreimbursable costs for flood control and for fish and wildlife enhancement would total $72,510,000 and $110,397,000, respectively. The last column presents the estimated total nonreimbursable costs of $182,907,000. As indicated, this value includes the estimated total allocated costs of features jointly

ALLOCABLE TO NONREIMBURSABLE PURPOSES

Facilities covered in this report	Capital costs of features jointly used, Bulletin No. 132-64	Capital costs allocable to nonreimbursable purposes: Features jointly used: Flood control	Features jointly used: Recreation and fish and wildlife enhancement	Initial specific recreation and fish and wildlife enhancement features**	Total joint and initial specific features: Flood control	Total joint and initial specific features: Recreation and fish and wildlife enhancement	Totals
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Project Conservation Facilities							
Upper Feather Division:							
Frenchman Unit	$ 3,170,000	$ 0	$ 1,590,000	$ 410,000	$ 0	$ 2,000,000	$ 2,000,000
Antelope Valley Unit	3,114,000	0	3,114,000	450,000	0	3,564,000	3,564,000
Grizzly Valley Unit, excluding pipeline	4,110,000	0	3,900,000	870,000	0	4,770,000	4,770,000
Oroville Division, excluding Oroville-Thermalito Power Facilities	312,820,000	67,780,000	0	19,513,000	67,780,000	19,513,000	87,293,000
California Aqueduct	151,150,000	0	6,650,000,	4,545,000***	0	11,195,000	11,195,000
Subtotal	$ 474,364,000	$67,780,000	$15,254,000	$25,788,000	$67,780,000	$ 41,042,000	$108,822,000
Project Transportation Facilities							
California Aqueduct, excluding the Coastal Division	$1,108,380,000	$ 0	$28,800,000	$33,275,000***	$ 0	$ 62,075,000	$ 62,075,000
South Bay Aqueduct, Del Valle Dam and Reservoir	14,380,000	4,730,000	4,030,000	3,250,000	4,730,000	7,280,000	12,010,000
Subtotal	$1,122,760,000	$ 4,730,000	$32,830,000	$36,525,000	$ 4,730,000	$ 69,355,000	$ 74,085,000
TOTAL COSTS OF FEATURES COVERED IN THIS REPORT	$1,597,124,000*	$72,510,000	$48,084,000	$62,313,000	$72,510,000	$110,397,000	$182,907,000

*Total costs of features not covered in this report (excluding specific recreation and fish and wildlife enhancement features):

Oroville Division, Oroville-Thermalito Power Facilities	$154,770,000
California Aqueduct, Coastal Division	53,540,000
South Bay Aqueduct, total excluding Del Valle Dam & Reservoir	32,120,000
Delta Facilities, excluding assumed federal flood control contribution	65,940,000
Upper Feather Division, remaining units	7,236,000
Upper Eel River Development	171,880,000
San Joaquin Drainage Facilities, assumed State share	49,750,000
North Bay Aqueduct	11,070,000
Local Projects (Davis-Grunsky)	131,420,000
	$677,726,000

*General reconciliation of costs presented in Bulletin No. 132-64:

Total features covered in this report	$1,597,124,000
Total features not covered in this report.	677,726,000
Separable recreation and unassigned costs (Table 17, Bulletin No. 132-64)	2,960,000
Expenditures credited with income received	340,000
Total, State Water Project (Col. 13, Table 22, Bulletin No. 132-64)	$2,278,150,000

**Based on the costs of initial installations sufficient to accommodate the first 10 years of development as shown on Table 3. Minor specific costs for flood control are ignored for purposes of this tabulation.

***The costs shown for the project conservation facilities include all specific recreation and fish and wildlife enhancement features from the Delta to Mile 18 Pumping Plant for the purposes of this tabulation only.

used and estimated costs of initial specific recreation and fish and wildlife enhancement features.

Table 3 repeats the cost estimates for initial specific recreation and fish and wildlife enhancement facilities. It presents in addition estimates of specific costs for such facilities continuing after the first 10-year period, which total about $74,909,000. These are the expenditures which would be made under the procedures of the Davis-Dolwig Act and which would be staged over a 10 to 50 year period.

The formulation of many of the recreation facilities have not been completed and recreation development plan reports have not been published. Therefore, the values in column 4 of Table 2 and in Table 3 are based on incomplete and approximate data. As the development of cost allocation values for all facilities to be jointly used for project purposes are completed and as the planning of specific recreation facilities becomes more advanced, it is probable that the total nonreimbursable costs for recreation and fish and wildlife enhancement will change in future reports of this series.

Appropriations for Nonreimbursable Costs

The Department is making and intends to continue to make requests to the Legislature for the reimbursement of moneys expended under the Burns-Porter Act for:

1. The costs of lands, easements, and rights-of-way purchased specifically for the purposes of recreation and fish and wildlife enhancement on an annual basis; and

2. The costs of each multiple-purpose facility allocated to the purposes of recreation and fish and wildlife enhancement, after completion of the respective facilities.

TABLE 3

ESTIMATED CAPITAL COSTS OF SPECIFIC FEATURES
FOR RECREATION AND FISH AND WILDLIFE ENHANCEMENT

(Preliminary, subject to revision)

Facilities covered in this report	Costs of specific recreation and fish and wildlife enhancement features	
	Initial installations*	Continuing installations**
Upper Feather Division:		
Frenchman Unit	$ 410,000	$ 829,000
Antelope Valley Unit	450,000	1,103,000
Grizzly Valley Unit	870,000	2,483,000
Oroville Division	19,513,000	51,144,000
California Aqueduct	37,820,000	13,530,000
South Bay Aqueduct	3,250,000	5,820,000
Total	$62,313,000	$74,909,000

* Sufficient to accommodate the growth in estimated visitor use during the initial 10-year period of operation.

** Sufficient to accommodate the continuing growth in estimated visitor use subsequent to the initial 10-year period of operation.

Costs of specific recreation facilities will be budgeted by the Department of Parks and Recreation.

Recommended 1965-66 Appropriations. The Department recommends that the Legislature appropriate $2,832,000 for fiscal year 1965-66 as reimbursement for the costs of lands, easements, and rights-of-way incurred in prior years for these specific nonreimbursable purposes, and for the costs of the Frenchman Unit allocable to nonreimbursable purposes. Appropriation of $2,299,100 for specific recreation facilities, as shown in the budget of the Department of Parks and Recreation for 1965-66, is also recommended.

Charges to Water Supply Contractors

Most of the capital costs of facilities of the State Water Project were assumed in Bulletin No. 132-64 to be reimbursable by the water supply contractors. Exceptions were costs of reservoirs of the Upper Feather Division which were allocated in a preliminary manner to recreation and fish and wildlife enhancement, flood control allocations of Oroville and Del Valle Reservoirs and costs of rights-of-way specifically acquired for recreation and fish and wildlife enhancement. Consequently the allocations in this report of portions of the costs of certain additional components of the Project to the nonreimbursable purposes of recreation and fish and wildlife enhancement, will tend to reduce reimbursable costs and hence charges to the contractors.

The tentative and final cost allocations derived in this series of reports will be reflected in the annual redetermination of charges to water supply contractors. The allocation percentages in this report for project transportation facilities will be accounted for in Bulletin No. 132-65 and in the statements of charges to be provided to water supply contractors on or before July 1, 1965.

The allocations for project conservation facilities will not be reflected in the Delta Water Charges paid by water supply contractors until the beginning of calendar year 1970, since the Delta Water Rate is established at $3.50 per acre-foot until that time.

CHAPTER II. INTRODUCTION

The State Water Project is being constructed for the purpose of rectifying many of the present water problems of the State. While the main water problem in California is that nature has not provided the right amounts of water in the right places at the right times, to meet the growing needs of cities and agriculture, there are many other water-associated problems including flood control, drainage, and water quality. The State Water Project, in addition to providing present solutions to a number of these problems, will provide other benefits, including hydroelectric power generation, recreation, and fish and wildlife enhancement.

Two of the five dams and reservoirs of the Upper Feather Division are being constructed for water supply, recreation, and fish and wildlife enhancement purposes, and three are being constructed for the latter two purposes only. The Oroville Division will provide water supply, flood control, hydroelectric power generation, recreation, and fish and wildlife enhancement. The Delta Facilities, while still under formulation, will probably include water supply, flood control, recreation, and fish and wildlife enhancement, and other purposes unique to this complex area. The Upper Eel River Development, being formulated as an additional project conservation facility, will be constructed for water supply, recreation, fish and wildlife enhancement, and other purposes. The three water transportation facilities of the State Water Project, the North Bay, South Bay, and California Aqueducts, will be built primarily for water supply,

but will include recreation and fish and wildlife enhancement purposes and flood control in some instances. Purposes of the San Joaquin Drainage Facilities, currently under formulation, will include water quality improvement and possibly recreation and fish and wildlife enhancement. Local projects receiving grants or loans under the provisions of the Davis-Grunsky Act, for which $130,000,000 is reserved in the State Water Project funds, will be constructed for one or more of the purposes of water supply, flood control, hydroelectric power generation, recreation, fish and wildlife enhancement, and other purposes. It may be seen from the foregoing that the purposes of recreation and fish and wildlife enhancement, in addition to water supply, are common among nearly all the facilities of the State Water Project.

Interest in the recreation and fish and wildlife enhancement aspects of the State Water Project is widespread. Sportsmen and outdoor enthusiasts are anticipating the fishing, camping, boating, and other outdoor experiences that the project will provide. Water supply contractors are particularly interested in the effects of cost allocations to nonreimbursable recreation and fish and wildlife enhancement purposes upon the payments pursuant to their contracts. Furthermore, the contractors, the Legislature, the State Administration, people of the State and the financial community are interested in the effects of cost allocations to these purposes upon the funds available to construct the project and upon the demand for General Fund moneys.

Existing Legislation

The California Water Code contains a number of statutes relating to recreation and to fisheries and wildlife.

Sections 1243 and 1257 of the Code relate to water rights and provide that the use of water for recreation and preservation and enhancement of fish and wildlife resources are beneficial uses of water.

Sections 233, 12581, and 12582 of the Code relate to studies by the Department of Water Resources and state that consideration shall be given all beneficial uses including preservation and development of fish and wildlife resources, and recreational uses of water.

Sections 253, 345, and 346 of the Code relate to land acquisition for recreation at state water projects and authorizes the Department to acquire land for this purpose.

The Davis-Dolwig Act was passed during the 1961 Legislative Session, adding Sections 11900 through 11925 to the Code. This legislation covers all phases of recreation and fish and wildlife preservation and enhancement at state water projects, and is the principal foundation for the Department's program in these fields. The Davis-Dolwig Act assigns certain responsibilities to the Department of Fish and Game and to the Department of Parks and Recreation as well as to the Department of Water Resources. It presents legislative policy on recreation and fish and wildlife conservation at state water projects from planning through construction to the operational phase.

The Davis-Dolwig Act declares recreation and the enhancement of fish and wildlife to be among the purposes of state water projects. It provides further that costs allocated by the Department to the purposes of recreation and fish and wildlife enhancement will be nonreimbursable by project water and power customers. Under this act, the Department may request appropriations from the General Fund for costs of recreation and fish and wildlife enhancement at such projects. The Department is required to make any revisions in the allocation of costs of any state water project as necessitated by the expenditure of funds under the Davis-Dolwig Act for enhancement of fish and wildlife and for recreation in connection with such works.

Future Legislation

There is increased interest in future legislation in this area as evidenced by Assembly Bill No. 17 of the 1964 First Extraordinary Session. The bill was referred to the Assembly Interim Committee on Water for study.

AB 17, as amended May 4, 1964, dealt with two matters: (1) the availability of tideland oil funds for construction of the State Water Project; and (2) the financing of, and allocations of cost to, the nonreimbursable functions of the project.

The bill provided for the annual deposit of $16 million into the California Water Fund from all tideland revenues received by the State, instead of the unlimited amount as then

provided by statute.[1/] It would have amended the California Water Resources Development Bond Act, commonly known as the Burns-Porter Act, to provide that the first $11 million deposited annually in the California Water Fund should be used, to the extent needed in that year, for Davis-Grunsky Act grants and loans.

AB 17 went on to provide that the next $5 million would be available for appropriation by the Legislature for payment of the nonreimbursable costs of the State Water Facilities, other than Davis-Grunsky Act projects, and the additional facilities authorized by Water Code Section 12938. The State Water Facilities, to which reference is made, are the initial works of the State Water Project, and the additional facilities are those needed to augment project water supplies in the Delta and to meet local needs. The Department would be required to submit to the Legislature cost allocations to the purposes of recreation and fish and wildlife enhancement for each facility. Based on this information, the Legislature would be authorized to make appropriations for such nonreimbursable costs. The expenditure of these appropriations for the State Water Facilities would offset equal amounts of general obligation bonds for construction of the additional

---

1/ Since the last legislative consideration of AB 17, there was enacted Senate Bill No. 60 (Calif. Stats. 1964, First Extraordinary Session, Ch. 138), which limited the portion of Long Beach tideland revenues to be deposited in the California Water Fund to $11 million annually.

facilities specified in Water Code Section 12938. Under the bill, the Department could not expend more on the nonreimbursable costs of any particular facility than was appropriated for that purpose by the Legislature.

The Department was requested by the Assembly Interim Committee on Water to present its views on Assembly Bill No. 17 and to answer certain specific questions with regard to cost allocations, nonreimbursable project costs, and the financing of such costs. This information was presented to the committee at its meeting in Santa Monica, California, on July 22, 1964.

The Department recommended to the committee, as it did during the legislative session, that the best way to achieve the basic purposes of Assembly Bill No. 17 was to amend the Davis-Dolwig Act. This recommendation was based essentially upon two grounds: (1) There are serious legal and constitutional questions involved in any major amendment to the Burns-Porter Act; and (2) The Davis-Dolwig Act deals specifically with nonreimbursable costs and is the act to which provisions relating to allocations and appropriations for the payment of such costs should properly be added. A draft of bill was recommended by the Department as a substitute for Assembly Bill No. 17. The recommended draft would amend the Davis-Dolwig Act:

1. To require the Department to compute the costs allocated to recreation and fish and wildlife enhancement for each facility or any state water project and submit the same to the Legislature. The Department would also submit revised allocations to meet changed conditions. The allocations submitted would become effective upon approval of the Legislature by concurrent resolution, provided that allocations submitted prior to any

regular session would become effective at the end of such session without further action unless the Legislature, by concurrent resolution, disapproved them. If an allocation were disapproved, the Department would be required to submit a new allocation.

2. To create the Davis-Dolwig Act Fund and to provide for the deposit and investment of funds therein.

3. To appropriate the money in the fund to the Department on a continuing basis for expenditure, or for reimbursement of prior expenditures from the California Water Fund or the California Water Resources Development Bond Fund, on the nonreimbursable costs of the State Water Facilities to the extent cost allocations would have been made by the Department for such purposes and to the extent they would have become effective after submission to the Legislature as set forth above. The money for expenditure or reimbursement would be transferred to the Central Valley Water Project Construction Fund so as not to result in any bond offset.

4. To provide specifically that the Davis-Dolwig Act would not limit the Department in the financing and construction of projects pursuant to the Burns-Porter Act.

Schedule for Cost Allocation

The Department reported to the Assembly Interim Committee on Water at the aforesaid meeting on July 22, 1964 that it had established the schedule set forth in Table 4 for the completion of initial cost allocations for component facilities of the State Water Project, in reply to a specific question by the committee.

TABLE 4
SCHEDULE FOR COMPLETION OF
COST ALLOCATION REPORTS

	Priority of cost allocations	Name of facility of the State Water Project	Date of completion of cost allocation report
1.	Completed facilities	Upper Feather Division:	
		Frenchman Unit	April 1964
		Antelope Valley Unit	January 1965
2.	Facilities currently under construction	Oroville Division	January 1965
		Upper Feather Division:	
		Grizzly Unit	January 1965
		California Aqueduct in the San Joaquin Valley	January 1965
3.	Facilities with construction scheduled to commence in 1965-66	South Bay Aqueduct:	
		Del Valle Dam and Reservoir	January 1965
4.	Facilities with construction scheduled to commence in 1966-67	California Aqueduct:	
		Cedar Springs Dam and Reservoir	January 1966
		Castaic Dam and Reservoir	January 1966
		Upper Feather Division:	
		Abbey Bridge Unit	January 1966
5.	Facilities with construction scheduled to commence in 1967-68	California Aqueduct:	
		West Branch and East Branch Divisions, Aqueduct	January 1967
		Perris Dam and Reservoir	
		Upper Feather Division:	
		Dixie Refuge Unit	January 1967
6.	Facilities still under formulation	California Aqueduct:	Following formulation of definite facilities
		Coastal Division	
		North Bay Aqueduct	
		Delta Facilities	
		San Joaquin Drainage Facilities	
		Upper Eel River Development	

Objectives and Organization of Report

The objective of this report is to present the Department's allocations of costs among purposes of those facilities of the State Water Project which are completed, currently under construction, or on which construction is scheduled to commence in fiscal year 1965-66. The facilities so covered are shown under Item Nos. 1 through 3 of the preceding schedule.

The allocations developed for the California Aqueduct are tentative and subject to revision because of the preliminary nature of estimates of some project benefits, the changes in aqueduct capacities and alignments not accounted for, the omission of some recreation features which are expected to be authorized in the future, and other considerations. The allocations for this facility are included in this report for illustrative purposes.

Project cost allocations and background information are presented in the chapters that follow. Chapter III, "Contract Provisions and General Criteria for Allocations of Project Costs", summarizes the portions of the Department's water supply contracts that pertain to the allocation of costs among purposes of the State Water Project and the criteria required to supplement these provisions.

Chapter IV, "Cost Allocation Methods and Procedures", contains brief descriptions of the technical terms, cost allocation methods, and procedures utilized in determining the items involved in cost allocations.

Chapters V, VI, and VII present the development of the allocations of project costs among purposes of the various facilities.

CHAPTER III. CONTRACT PROVISIONS AND GENERAL CRITERIA FOR ALLOCATIONS OF PROJECT COSTS

The general legislative directives concerning allocation of project costs, which are primarily set forth in the Davis-Dolwig Act, are described in Chapter II. This chapter describes the provisions of the water supply contracts and general criteria followed by the Department in implementing those directives.

Provisions of Water Supply Contracts

The water supply contracts executed by the State contain certain provisions with regard to the allocation of costs among project purposes. The major provisions in this area are as follows:

1. That the State shall allocate the costs of facilities to project purposes and shall determine those costs which are reimbursable and those costs which are nonreimbursable by water supply contractors. For example, Article 22(a) states in part:

> "Wherever reference is made, in connection with the computation or determination of the Delta Water Charge, to the costs of any facility or facilities included in the System, such reference shall be only to those costs of such facility or facilities which are reimbursable by the contractors as determined by the State."

These words are essentially repeated in Article 23 in connection with the Transportation Charge.

2. That the Federal Government shall perform certain cost allocations, as set forth in Article 22(e):

> ". . . .allocations to purposes the costs of which are to be paid by the United States shall be as determined by the United States."

3. That the Delta Water Charge shall be determined on the basis of an allocation to project purposes, by the Separable Costs-Remaining Benefits Method, of all projected costs of all initial project conservation facilities, additional project conservation facilities, and supplemental conservation facilities. For the initial project conservation facilities, this provision is specific only as to those features located in and above the Delta. [Articles 22(e) and 22(g).]

4. That costs chargeable to power generation and transmission shall be allocated as set forth in Articles 22(e) and 22(g):

> ". . . .all of the projected costs properly chargeable to the generation and transmission of electrical energy in connection with operation of project conservation facilities shall be allocated to the purpose of water conservation in, above, and below the Delta."

5. That for the purpose of determining the Delta Water Charge, the reimbursable costs of the aqueduct intake facilities at the Delta, Pumping Plant I (Delta Pumping Plant), the aqueduct from the Delta to San Luis Forebay, San Luis Forebay, and San Luis Reservoir shall be allocated between the purposes of water conservation and water transportation by the Proportionate Use of Facilities Method. [Article 22(e).]

The water supply contracts, in referring to the term "allocation", do not specify the project purposes to which allocations shall be made and the costs allocated to which purposes shall be deemed nonreimbursable. Considering the general provisions of the contracts and the additional guidance provided by the Davis-Dolwig Act and existing or proposed contracts with the United States for flood control contributions, the conclusions below may be drawn as to such project purposes and the reimbursability thereof. These are used for purposes of this report.

1. Water Supply. This purpose includes both (a) the development of the minimum project yield of facilities located in, above, and below the Delta which are classified as "project conservation facilities" and (b) the conveyance of that yield to areas of beneficial use, in facilities classified as "project transportation facilities". The cost of project conservation facilities and project transportation facilities, allocated to the purpose of water supply, are reimbursable by water supply contractors through the Delta Water Charge and the Transportation Charge, respectively.

2. Power Generation. This purpose is taken for this report to cover only power generation in connection with project conservation facilities. The revenues derived from the sale or other disposal of electrical energy generation derived therefrom, as reduced by the costs allocated to this purpose, are deducted from the costs of project conservation facilities which are reimbursable by water supply contractors through the Delta Water Charge.

3. Flood Control. Allocations of cost to this purpose are made for those facilities being constructed by the State which will produce flood control benefits and for which the Federal Government has assumed or will assume financial responsibility. Costs allocated to

flood control as determined by the United States are nonreimbursable by water supply contractors.

4. Recreation and Fish and Wildlife Enhancement. In this report, allocations of costs to recreation are not distinguished from those to fish and wildlife enhancement. If further consideration indicates the desirability of separating such values, future reports will take this into account.

General Criteria for Cost Allocations

As indicated above, the water supply contracts specify the method to be used in allocating costs among purposes of project conservation facilities located in and above the Delta. They are silent, however, as to the methods to be used for allocating costs of other facilities and as to other details. In view of this, it has been necessary for the Department to supplement those provisions with general criteria in order that it can determine those costs which are reimbursable and those which are nonreimbursable by water supply contractors.

The principal points that the contract provisions do not cover are as follows:

1. The method to be used for allocations of cost among purposes of project conservation facilities located below the Delta.

2. The method to be used for allocations of cost among purposes of project transportation facilities.

3. The subdivisions of facilities or groups of facilities for which allocations are to be made.

4. When cost allocations are to be made.

5. The form of the results of cost allocations.

6. How the results will be reflected in charges to water supply contractors.

The Department's present criteria with respect to these items are discussed in the following sections:

Method of Allocating Costs of Project Conservation Facilities Below the Delta

The costs of multiple-purpose facilities located below the Delta, the water supply features of which will be operated in whole or in part for water conservation, will be allocated among project purposes by the Separable Costs-Remaining Benefits Method. Articles 1(g)(3) and 1(g)(4) of the "Standard Provisions for Water Supply Contract" specify the facilities below the Delta to which reference is made. The costs allocated to each project purpose in this manner will be divided between the water conservation and water transportation functions by the Proportionate Use of Facilities Method specified in Article 22(e) of the contracts.

Method of Allocating Costs of Project Transportation Facilities

The costs of multiple-purpose facilities, the water supply features of which will be operated solely for water transportation, will be allocated among project purposes by the Alternative Justifiable Expenditure Method. The total costs of transportation facilities of the California Aqueduct, allocated to each project purpose, will be the sum of the costs allocated

to that purpose by this method and the costs of facilities below the Delta allocated to the same purpose under water transportation by the method described in (1) above. A special procedure applying to the South Bay Aqueduct is described in Chapter VII.

Facilities to be Covered by Cost Allocations

Cost allocations will be made considering as separate entities each of the authorized components of the project conservation facilities and project transportation facilities set forth in Table 5, or subdivisions thereof. Those components which encompass a number of separate multiple-purpose features, such as the Delta Facilities and the Upper Eel River Development, may be subdivided into several entities for cost allocation in future issues of this report.

TABLE 5

COMPONENTS OF THE STATE WATER PROJECT
TO BE COVERED BY COST ALLOCATIONS

Major project subdivision	:	Features included
Project Conservation Facilities		
a. Upper Feather Division		Frenchman Unit
b. Upper Feather Division		Antelope Valley Unit
c. Upper Feather Division		Grizzly Valley Unit
d. Upper Feather Division		Abbey Bridge Unit
e. Upper Feather Division		Dixie Refuge Unit
f. Oroville Division		Oroville Dam and Reservoir, Thermalito Diversion Dam, Thermalito Forebay, Thermalito Afterbay and Oroville-Thermalito Power Facilities
g. Delta Facilities*		. . . . .
h. California Aqueduct		San Luis Dam, Reservoir, and Pumping-Generating Plant and the portion of the aqueduct from the Delta through San Luis Forebay required for water conservation
i. Upper Eel River Development*		. . . . .
Project Transportation Facilities		
a. North Bay Aqueduct		Entire aqueduct
b. South Bay Aqueduct		Del Valle Dam and Reservoir
c. California Aqueduct		All of the aqueduct and regulating reservoirs south of the Delta except San Luis Dam, Reservoir and Pumping-Generating Plant and the portion of the aqueduct from the Delta through San Luis Forebay required for water conservation

*These facilities are currently being formulated.

Time of Initial Allocation

Allocations of estimated costs among project purposes will be made for each of the components of the State Water Project shown in Table 5, in the fiscal year prior to the fiscal year during which actual construction of the component is scheduled to commence. Allocations for those components already constructed or currently under construction will be completed as soon as possible.

A cost allocation may be subsequently revised based on a formal demonstration that such revision is warranted by reason of substantial changes in the factors which supported the original allocation.

Form of Results

The allocation of costs among project purposes, for the features of each component jointly used for such purposes, will be expressed in terms of percentage values. These values will be computed to subdivide (a) the total capital costs of the features jointly used, and (b) the minimum operation, maintenance, power, and replacement costs of the features jointly used.

Application of Results to Water Supply Charges

The estimated and/or actual costs for each purpose of the respective components of the State Water Project will be determined as the sum of:

1. The capital and annual operation, maintenance, power and replacement costs for those specific features constructed solely for the particular purpose;

2. The allocated share of capital and minimum operation, maintenance, power, and replacement costs[1/] for those features jointly used with other purposes as determined by applying the percentages determined in the cost allocation; and

3. The annually determined share of variable operation, maintenance, power and replacement costs[1/] for those features jointly used with other purposes, as such costs are allocated pursuant to the provisions of the water supply contracts; considering that the annual amounts of water delivered to those specific features constructed solely for the particular purpose are correlative with the annual amounts of water delivered to water supply contractors.

For all practical purposes, operating costs for the project conservation facilities located in and above the Delta will be incurred independently of the actual deliveries of project water and are in the nature of minimum costs. Similarly, the costs of providing water to compensate for evaporation and seepage losses from reservoirs and aqueducts of the project transportation facilities are included in the minimum category. Variable operating costs, which are directly related to the conveyance of water for the purposes of water supply, recreation and fish and wildlife enhancement, will constitute the major portion of costs incurred in the pumping and power recovery plants of the project facilities located below the Delta.

Operating costs included in the variable category are thus allocated annually among project purposes consistently

---

1/ See footnote 2, Chapter I.

with the annual distribution of such costs among water supply contractors. The allocation among purposes of capital costs and operating costs in the minimum category, by the application of fixed percentages, is also consistent with the distribution of such costs among water supply contractors.

The percentages derived in the cost allocations for the project transportation facilities, shown in Table 5, must be translated into percentages applicable to component aqueduct reaches before reimbursable capital and minimum operating costs can be distributed among water supply contractors. Pursuant to Article 23 of the water supply contracts, the distribution of reimbursable costs among water supply contractors is based upon the proportionate use of aqueduct reaches of the project transportation facilities.

Under the Department's present criteria, the allocated costs of each portion of a project transportation facility jointly used for project purpose will be distributed among component aqueduct reaches of that facility: (1) for allocated capital costs, in the proportions that the estimated joint capital costs of the respective reaches bear to the total of joint capital costs of the project transportation facility; and (2) for the allocated minimum operation, maintenance, power, and replacement costs, in the proportions that the estimated equivalent joint minimum operating costs of the respective reaches bear to the total of such costs of the project transportation facility.

CHAPTER IV. COST ALLOCATION METHODS AND PROCEDURES

Reference was made in Chapter III to three methods utilized by the Department in allocating costs of the State Water Project among project purposes. By these methods the costs of the Project that are reimbursable and those that are nonreimbursable by water supply contractors are determined.

The three methods and the uses to which they are put are summarized as follows:

1. The Separable Costs-Remaining Benefits Method, for the allocation among project purposes of the costs of those multiple-purpose facilities which accomplish in whole or in part the conservation of water;

2. The Alternative Justifiable Expenditure Method, for the allocation among project purposes of the costs of those multiple-purpose facilities, which are solely for water transportation; and

3. The Proportionate Use of Facilities Method, for the division between the conservation and transportation functions of costs allocated among project purposes by Method 1 for those multiple-purpose facilities serving both functions.

These three methods of cost allocation are well known. In March 1954, the agencies of the United States dealing principally with multiple-purpose projects (the Federal Power Commission, the U. S. Army Corps of Engineers, and the Department of the Interior) agreed to utilize these methods, in order of preference as listed above.

This chapter briefly describes these methods, and the procedures utilized by the Department in calculating the items entering into the allocations.

General Considerations

"Cost allocation" is the process of apportioning financial costs of a multiple-purpose project equitably among the various purposes served by the project. The allocation embraces all financial costs for all features of the project, including those costs incurred for construction, operation, maintenance, power and replacement. The total cost of combining several purposes in a comprehensive multiple-purpose project is less than the sum of the costs of separate projects to provide the various purposes. The saving derived through use of joint features of the multiple-purpose project is shared by all purposes under the Department's procedure.

The Department's cost allocation procedure consists of:

1. Assigning costs directly attributable to incorporating each individual purpose in a multiple-purpose project.
2. Allocating a share of the remaining joint costs to each purpose of the multiple-purpose project.

The arbitrary aspect of the cost allocation procedure is the method used to allocate the remaining joint costs among purposes. Therefore that cost allocation method by which the greatest portion of the total project cost is assigned directly to purposes, thus minimizing the amount of remaining joint costs, is the most preferred.

Assignment of Costs Attributable to Each Purpose

The assignment of costs directly attributable to incorporating each purpose within a project may be on the basis of:

1. Specific costs, which are the costs of those individual features of a multiple-purpose project which can be readily identified as serving one project purpose exclusively.

2. Separable costs, which are the total costs of the multiple-purpose project which could be omitted if one particular purpose of the project were excluded. The separable costs of a purpose are usually greater than the specific costs of the purpose.

The remaining joint costs of the multiple-purpose project after the assignment of "specific costs" to purposes would be the cost of those features jointly used; whereas the remaining joint cost after the assignment of "separable costs" to purposes may be significantly less than the cost of those features jointly used.

Allocation of Remaining Joint Costs

The assignment of a share of the remaining joint costs to each purpose of the project may be based upon percentages for each purpose computed on one of the following bases:

1. Remaining Justifiable Costs (or Remaining Benefits), which are the costs in excess of either the specific or separable costs of the multiple-purpose project, assigned to the purpose in question, that could be justified for a hypothetical single-purpose project.

2. Use of Facilities, which constitutes the percentage of physical use by a project purpose of joint features of the multiple-purpose project, measured in units capable of describing the proportionate physical use of all project purposes.

The assignment of a share of the remaining joint costs to each project purpose in proportion to "remaining justifiable costs" is the more sophisticated and preferred approach. A more

equitable distribution of costs is obtained with this method by preventing costs allocated to any purpose from exceeding corresponding benefits.

The total "justifiable costs" for any purpose represent the maximum cost properly allocable to the purpose and are taken as equivalent either to the "project benefits" or the "alternative costs" of the purpose, whichever are less, defined as follows:

1. Project benefits, are the net values of goods and services produced by the project and by activities stemming from or induced by the project after deducting all associated nonproject economic costs involved. Associated costs are those extra costs incurred by primary beneficiaries (over those they would incur in the absence of the project) to realize their benefits in full. Tangible benefits are those that can be expressed in monetary terms, while intangible benefits cannot be so expressed. Project benefits may also be subdivided into primary benefits, those resulting directly from the project, and secondary benefits, those accruing indirectly as a result of economic activity induced by, or stemming from, a project.

2. Alternative costs, are those for the least costly single-purpose alternative means of providing the same benefits of the purpose included in the multiple-purpose project. The alternative costs are estimated as those for a hypothetical single-purpose project that may be located at the same site as the multiple-purpose project.

Cost Allocation Methods for the State Water Project

The general considerations described in the preceding section applied to the three cost allocation methods utilized by the Department for the State Water Project are as follows:

1. The Separable Costs-Remaining Benefits Method (a) assigns costs attributable to incorporating each purpose in a multiple-purpose project on the basis of "separable costs" and (b) allocates a share of the remaining joint costs to each purpose on the basis of proportionate "justifiable costs" remaining after deducting "separable costs".

2. The Alternative Justifiable Expenditure Method (a) assigns costs attributable to incorporating each purpose in a multiple-purpose project on the basis of "specific costs" and (b) allocates a share of the remaining joint costs to each purpose on the basis of proportionate "justifiable costs" remaining after deducting "specific costs".

3. The Proportionate Use of Facilities Method (a) assigns costs attributable to incorporating each purpose in a multiple-purpose project on the basis of "specific costs" and (b) allocates a share of the remaining joint costs to each purpose on the basis of proportionate "use of facilities".

These methods are further described in the sections that follow. These general procedures are varied somewhat among the allocations of costs of the various project facilities, as explained in Chapters V, VI and VII.

Separable Costs-Remaining Benefits Method

The general computational procedure utilized to prepare allocations by the Separable Costs-Remaining Benefits Method consists of the following steps:

Step No.	Item
1.	The net benefits due to the project for each project purpose are estimated.
2.	The alternative costs of single-purpose projects capable of providing the same benefits as Step No. 1 are estimated.
3.	The justifiable cost for each purpose is determined as the lesser of values obtained from either Step No. 1 or Step No. 2 for each purpose.
4.	The separable cost of each purpose is estimated.
5.	The remaining justifiable costs for all purposes are determined by deducting the separable costs of each purpose in Step No. 4 from its justifiable cost Step No. 3.

Step No.	Item
6.	Percentages are computed by dividing the remaining justifiable costs for each purpose by the total remaining justifiable costs for all purposes.
7.	The separable costs of all purposes are deducted from the total cost of the multiple-purpose project to determine the total remaining joint costs. The latter costs are distributed proportionately among purposes by applying the percentages determined in Step No. 6.
8.	The total project cost allocated to each purpose is determined as the sum of the estimated separable cost from Step No. 4 and the remaining joint cost assigned to the purpose in Step No. 7.
9.	The percentage of the total project cost allocated to each purpose of the total cost of the multiple-purpose project is determined.

The above computational steps result in the percentage of the total costs of the multiple-purpose project allocated to each project purpose. It was stated in Chapter III that the Department's present criteria provide for cost allocations to be expressed in terms of percentages, for each project purpose, of the total costs of only those features jointly used. It is necessary, therefore, to extend the above general procedure for the allocation of costs of components of the State Water Project by the following additional steps:

Step No.	Item
10.	The specific cost of each purpose is estimated.
11.	The costs of features jointly used by all project purposes are allocated among project purposes by deducting the specific costs of Step No. 10 from the allocated total project costs of Step No. 8.
12.	The allocated costs determined in Step No. 11 are computed as percentages of the total costs of features jointly used by all project purposes.

In the cost allocations presented in Chapters V, VI, and VII, special steps unique to a particular allocation are denoted by suffixes to the related step of the above general procedure. Step No. 12 in all cases, however, presents the results of the allocation in the desired form.

Alternative Justifiable Expenditure Method

The general computational procedure utilized to prepare allocations by the Alternative Justifiable Expenditure Method differs from the procedure for the Separable Cost-Remaining Benefits Method only in that "specific costs", rather than "separable costs", are used in Steps Nos. 4 through 8. Step No. 12 presents the results of the allocation in the form to be used for State Water Project cost allocations.

Proportionate Use of Facilities Method

The general computational procedure to prepare allocations by the Proportionate Use of Facilities Method consists of the following steps:

Step No.	Item
1.	The specific cost for each purpose of the multiple-purpose project is estimated.
2.	The costs of features jointly used by project purposes are determined by deducting the total specific costs for all purposes from the total cost of the multiple-purpose project.
3.	The percentage of use of the joint features is determined for each purpose on the basis of appropriate physical measures, such as aqueduct capacities.
4.	The costs of the jointly used features of Step No. 2 are distributed among purposes in proportion to the percentage of use assigned to each purpose in Step No. 3.

Step No.	Item
5.	The total cost allocated to each purpose is determined by adding the specific cost in Step No. 1 to the joint cost distributed to the purpose in Step No. 4.

Step No. 3 presents the results of the allocation in the desired form.

Procedure for Computing Items Involved in Cost Allocations

The following sections briefly describe the procedures currently utilized by the Department in calculating the items of costs and benefits entering into cost allocations.

Accounting for Interest

Construction costs for some facilities of the State Water Project are distributed over a considerable number of years. The installation of certain aqueduct pumping and power recovery units are staged within the period of buildup to full operational use of the facilities to minimize interest costs. The annual operating costs of the project, and the annual benefits derived from the project, will increase over a period of time.

Considering the long-term variation of costs and benefits, it is necessary that interest charges be included in the calculation of the items entering into the cost allocation to measure properly the relative magnitude or weight of each item. The Department utilizes the following computational procedure to account for interest:

1. All estimated annual values of first costs; of operation, maintenance, power, and replacement costs to the end of the period of analysis; and of benefits to be realized to the end of the period of analysis are converted to an equivalent total value at the present time by application of the appropriate "present worth" factor to each annual cost or benefit. The present worth factor for each annual value is equal to $\left(\frac{1}{(1 + i)^n}\right)$; in which "i" represents the applicable annual interest rate and "n" represents the number of years between the "present" and the year in which the annual cost or benefit is to be incurred or realized.

2. The total present worths of all annual first costs; all annual operation, maintenance, power and replacement costs; and all annual benefits are converted to equal annual equivalent values for the period of analysis; the total present worth of such computed equal annual values being equal to the total present worth of the estimated annual values determined in (1) above.

The present worth concept is a common tool utilized in economic and engineering studies. In such studies it is necessary to recognize the time value of money. Because of interest charges and credits, a dollar expended or received at the present time is worth more than the prospect of expending or receiving a dollar next year or at some later date. The relative worth of a dollar to be expended or received some time in the future as compared to the worth of a dollar expended or received at the present time depends upon the prevailing interest rate and time period involved, and is accurately measured by the formula referred to in (1) above.

The term "first costs", indicated above, refers to capital costs exclusive of interest charges during the construction period, as differentiated from the term "capital costs"

which, in cost allocation terminology, includes such interest charges.

Interest Rate. Article 1(r) of the "Standard Provisions for Water Supply Contract" specifies that the "project interest rate" shall be the weighted average of interest rates paid by the State on bonds issued under the Burns-Porter Act, without regard to any premiums received on the sale thereof. The project interest rate as of April 1, 1964, was reported in Bulletin No. 132-64 to be 3.508 percent per annum, reflecting the sale of Series "A" bonds on February 18, 1963. The current project interest rate is 3.544 percent per annum, reflecting the sale of all Water Bonds through the sale of Series "C", which occurred on October 4, 1964. For financial planning purposes in Bulletin No. 132-64, and because of the reasons given in Chapter XIII thereof, an interest rate of four percent was assumed for the long-term financial analyses.

It is generally assumed for the allocations of State Water Project costs derived in this report that the long-term interest rate which will be paid on Water Bonds will approximate four percent per annum. Variations from this assumption in the various cost allocations are described in Chapters V, VI and VII.

Period of Analysis. Article 1(t) of the "Standard Provisions for Water Supply Contract" specifies that the "project repayment period" shall be the period beginning on January 1, 1961 and extending until all bonds secured by the

pledge of revenues under the Burns-Porter Act have been repaid. Although it is impossible to predict at this time when the last Water Bond will be retired, the project repayment period will end no later than 50 years after the last Water Bond is issued since the maximum term of the bonds is 50 years.

The cost allocations in this report are based upon an assumed "period of analysis" as differentiated from the "project repayment period". The period of analysis is considered to be the period extending 50 years after the completion of construction of the features jointly used in the first operable subdivision of the particular component of the State Water Project being allocated.

Project Costs

Costs of the State Water Project used for cost allocations are limited to those for facilities financed by the State and to a part of those financed by the Federal Government. The costs of work financed by local agencies, such as irrigation distribution systems to convey project water from the aqueducts to the farmers' headgates, are excluded from project costs, but are included in the determination of net benefits due to the project.

The estimates of project costs included in this report are generally based on the data presented in Bulletin No. 132-64. Exceptions are costs of facilities for which allocations were made prior to this report or facilities substantially completed so that a closer estimate of the final construction costs, than was possible for that bulletin, can

now be made on the bid amounts. The methods utilized for estimating project costs are described in Chapter XI of Bulletin No. 132-64.

The estimates of costs of specific recreation and fish and wildlife enhancement facilities, which were not covered in that bulletin, were made for this report.

Project Benefits

The evaluation of benefits entering into cost allocations by the Department are limited to those which are primary and tangible, as previously defined. The following sections briefly describe the general methods for computing benefits for each of the project purposes covered by the allocations in this report.

Water Supply. As stated in Chapter III, the project purpose of water supply includes both the development of a regulated water supply in project conservation facilities and the conveyance of that supply in project transportation facilities to areas in which the water is beneficially used. Benefits accrue due to the water supply so made available for both agricultural and municipal and industrial usages within project service areas, and for this report are measured at the points of delivery from the project facilities. Water supply benefits are measured separately for agricultural usages and for municipal and industrial usages.

The measure of primary benefit to lands within agricultural service areas, which will be irrigated by project water, is taken as the difference between net returns from

farming operations with and without project water, reduced by the costs of the local distribution system between the project facility and farm headgates. The net return from farming operations is considered to be the difference between gross income and all farm expenses, except water costs and either land rental or interest on capital invested in the land.

The measure of primary benefit for municipal and industrial usages is based on either (1) the estimated cost of water from the least expensive alternative source other than the State Water Project or (2) the estimated maximum price that the contracting agency is willing to pay for project water, for areas where there is no practical alternative source. The measure of benefit for municipal and industrial usages on either of these two bases admittedly yields results that are less than those measured in a manner similar to that used for irrigated agriculture. Such an approach, however, would require prognostication for many years to come, of the economic values resulting from increased income, increased land values, and other factors which would have little reliability.

It was indicated above that water supply benefits are derived from the combined water supply functions of project conservation facilities and project transportation facilities. Costs of components of these facilities are allocated separately under the criteria set forth in Chapter III. Water supply benefits must therefore be divided and assigned among the component facilities of the State Water Project for the cost allocations.

In approaching this assignment of benefits, it is considered that all currently authorized works of the State Water Project constitute one integrated water supply project, except for the relatively minor reservoirs located in the Upper Feather Division which are operated primarily for local needs. All water supply costs of the major facilities should share proportionately in the water supply benefits of the integrated project. Such water supply benefits are therefore distributed among the components of the State Water Project in proportion to the estimated costs of the components allocable to water supply. Benefits from the units of the Upper Feather Division are treated individually.

Benefits from project purposes other than water supply are estimated for each individual component of the State Water Project being considered in the respective cost allocation. Thus it is not necessary to assign project-wide benefits for these purposes among components as in the case of water supply.

Recreation and Fish and Wildlife Enhancement. The project purpose of recreation includes all forms of outdoor leisure-time activity that may be enhanced by the presence of a water project facility. The primary benefit of the project purpose is the satisfaction received by individual recreationists, as distinguished from the secondary benefits accruing to the recreation industry in the area, such as resorts, hotels, and commercial enterprises.

The project purpose of fish and wildlife enhancement consists of the improvement by a project of habitats, or the provision of new habitats where none existed before, resulting in increased populations of fish and wildlife. The primary benefit of the project purpose is the value of the increased catch, in the case of commercial fisheries, or the satisfaction received by individual fishermen and hunters.

The benefits from a project due to fish and wildlife enhancement are measured by the same procedures as for the project purpose of recreation, except those accruing to commercial fisheries. Due to the preliminary nature of this report, no attempt is made herein to distinguish between the two purposes in the calculation of project benefits, because the benefits for both are calculated largely in the same manner. These project purposes may be separated as more definitive cost allocations are evolved in future issues of this series of reports.

The estimated increase in visitor-day use attributable to a project is the basis for calculating recreation benefits. A monetary benefit per visitor-day is estimated from a sample study of travel costs incurred by recreationists originating within the State who visit the area of the project facility or a similar area. These data are correlated by the Trice-Wood method. This method assumes that the visitors who spend the most money in traveling to use a recreation area establish the value of the recreation to be found there. Other visitors who spend less on transportation are enjoying the same facilities at lower cost. Consequently, the recreationist who spends less is

receiving a benefit in the amount of the difference in these respective transportation costs. An average benefit is thus derived by empirical means which is applicable to all visitor-day use for the area in question.

Projections of the future numbers of visitations to recreational features are based upon an approved plan. Such plans are contained in two types of reports prepared by the Department for each project facility in carrying out the legislative directives for the provision of recreation and fish and wildlife enhancement at state water projects. These are:

1. The Recreation Land Use and Acquisition Plan, and
2. The Recreation Development Plan

The "Recreation Land Use and Acquisition Plan" is an internal report which contains data on the estimated total cost of land acquisition, the number of parcels involved, the total acreage, and the number of residential properties to be acquired. It is prepared through interagency agreement by the Department of Parks and Recreation, and is officially transmitted to the Department. The Department reissues the report which, when approved by the Director of Water Resources and by the Department of Finance, authorizes appropriate personnel of the Department to proceed with the acquisition of approved recreation lands concurrently with the acquisition of lands for other project purposes in an effort to minimize total land acquisition costs. This is accomplished in accordance with Section 11900 of the California Water Code. The

preparation of the "Recreation Land Use and Acquisition Plan" is coordinated by the Department of Parks and Recreation with concerned federal, state, and local agencies, including the Departments of Fish and Game and Water Resources. It comprises the control document which guides the preparation of the subsequent "Recreation Development Plan".

The "Recreation Development Plan" is an official report of the Department and is published in the Bulletin No. 117 series. This bulletin is prepared for submittal to the Legislature in accordance with Section 345.1 of the California Water Code. In addition to presenting officially the land use and acquisition plan, it includes plans for initial and future recreation developments, data on the evaluation of recreation and fish and wildlife benefits and costs as prescribed in Section 11911 of the California Water Code. The bulletin also substantiates and justifies capital outlay items in budget requests for the construction of initial recreation and fish and wildlife enhancement facilities at state water projects. It is prepared essentially in the same manner as outlined above for the "Recreation Land Use and Acquisition Plan".

The current schedule of the Department for completion of reports on "Recreation Land Use and Acquisition Plans" and "Recreation Development Plans", together with the construction of initial specific recreation and enhancement facilities, is shown in Table 6. The list of aquatic parks or fishing access sites along the California Aqueduct is incomplete, especially in regard to the reaches in Southern California.

TABLE 6

CURRENT SCHEDULE FOR COMPLETION OF PLANNING AND CONSTRUCTING SPECIFIC RECREATION AND FISH AND WILDLIFE ENHANCEMENT FEATURES

Facilities and features	Recreation land use and acquisition plan	Recreation development plan	Construction of initial features
Upper Feather Division:			
Frenchman Unit	-	March 1961	November 1964
Antelope Valley	-	March 1962	June 1965
Grizzly Valley Unit	November 1963	May 1965	June 1967
Abbey Bridge Unit	October 1965	February 1966	*
Dixie Refuge Unit	*	*	*
Oroville Division:			
Oroville Reservoir	August 1961	January 1966	*
Thermalito Forebay	August 1961	January 1966	March 1968
Thermalito Afterbay	January 1963	January 1966	March 1968
Feather River Dredger Tailings	July 1966	November 1967	May 1970
Delta Facilities	*	*	*
Upper Eel River Development	*	*	*
North Bay Aqueduct	*	*	*
South Bay Aqueduct, Del Valle Reservoir	June 1962	*	April 1967
North San Joaquin Division:			
Aqueduct	January 1965	-	-
Bethany Reservoir	-	*	*
Corral Hollow Fishing Access Site	-	October 1968	April 1971
Ingram Creek Aquatic Park	-	February 1966	April 1968
San Luis Division:			
Aqueduct	January 1967	-	-
San Luis Reservoir and Forebay	-	January 1965	April 1968
Los Banos Detention Reservoir	-	*	*
Three Rocks Fishing Access Site	-	November 1968	April 1971
South San Joaquin Division:			
Aqueduct	May 1965	-	-
Kettleman City Aquatic Park	-	December 1965	April 1968
Tupman Aquatic Park	-	October 1974	April 1978
Buena Vista Aquatic Park	-	October 1967	April 1971
Wheeler Ridge Fishing Access Site	-	October 1971	April 1974
East and West Branch Divisions:			
Aqueduct	July 1965	November 1968	July 1972
Castaic Reservoir	June 1964	November 1966	November 1971
Cedar Springs Reservoir	June 1962	November 1967	July 1972
Perris Reservoir	November 1961	November 1969	July 1973
Pyramid Reservoir	June 1965	*	*
San Joaquin Drainage Facilities	*	*	*

*Schedule not yet established.

Flood Control. The project purpose of flood control includes the reduction or prevention of losses caused by floods in the area downstream from the project, and the increase in productive activity resulting from the elimination or reduction of flood hazards. Three types of primary tangible benefits are associated with the project purpose of flood control: (1) the prevention of loss of goods or services that would otherwise occur as a result of floods; (2) the reduction in costs of operation, maintenance, and replacement of existing flood control works; and (3) the enhancement of land values resulting from improvements in land use patterns due to the reduction or elimination of flood hazards.

The standards and procedures for measuring flood control benefits for facilities of the State Water Project are those utilized by federal agencies, since the costs allocable to the project purpose of flood control will be primarily financed by the United States.

Power Generation. The benefits derived from the project purpose of power generation are generally measured as the estimated costs of an equivalent amount of power from the source most likely to be developed as an alternative to the proposed development, with appropriate adjustment for transmission costs and losses. For this report, the most likely alternative source is assumed to be a privately-financed steam-electric plant, in view of the predominance of steam-electric capacity being installed in California.

Other Project Purposes. Benefits may accrue from other aspects of the State Water Project operations such as navigation improvement, water quality management, drainage, and others. Such additional purposes would be related largely to facilities of the State Water Project currently under formulation, and are not included in the cost allocations of this report.

CHAPTER V. COST ALLOCATIONS FOR COMPLETED FACILITIES

The schedule shown in Table 4 indicates those cost allocations for the State Water Project which are included in this report. This chapter presents the allocations of cost among project purposes, under the first category in that table, for those project components in which construction of features jointly used for project purposes is completed.

Construction is completed for two of the components of the State Water Project shown on Table 5 for which allocations are to be made. These are the Frenchman Unit and the Antelope Valley Unit, both of the Upper Feather Division. The locations of these components are shown on Plate 1.

This chapter briefly describes the history of each facility including pertinent allocations previously made, a summary of the derivation of major items entering into the cost allocation, and the cost allocation itself as currently determined by the Department.

Upper Feather Division-Frenchman Unit

The upstream features (now known as the "Upper Feather Division") were authorized by the Legislature as part of the Feather River Project (now known as the "Feather River Facilities") in 1957.[1/]

1/ Calif. Stats. 1957, Ch. 2359, Water Code Sec. 11260.

The Director of Water Resources, by executive order on October 14, 1958,[2] defined the upstream features as those described in Bulletin No. 59.[3]

The Frenchman Project (now known as the "Frenchman Unit") described in Bulletin No. 59 consisted of a reservoir of 50,000 acre-feet gross capacity and a system of works to regulate the flows of Little Last Chance Creek for irrigation use in Sierra Valley, to form the basis for enhancement of an outdoor recreational area, and to provide incidental flood control protection to the downstream area.

The allocation of costs of the Frenchman Project presented in Bulletin No. 59 resulted in the following distribution of costs among primary project purposes:

	Annual cost	Distribution
Irrigation (water supply)	$30,200	46%
Recreation	36,100	54%
Total	$66,300	100%

The annual costs included in the allocation were those for the dam, reservoir and public recreation features. Annual costs associated with lands, easements, rights-of-way and relocation of public utilities, amounting to about $22,700, were excluded on the basis of assumed criteria by the Department at the time the report was prepared. These criteria have

---

2/ Department of Water Resources, Project Order No. 1, dated October 14, 1958.

3/ Department of Water Resources "Bulletin No. 59, Investigation of Upper Feather River Basin Development", dated February 1957.

subsequently been modified to include such costs in allocations among project purposes.

The construction of Frenchman Dam and Frenchman Lake[4] was commenced in August 1959 and was completed in October 1961. The initial recreation features were completed during 1964 in accordance with a previously prepared plan.[5] They have served a considerable number of visitors who have made use of the reservoir and the surrounding area.

The Frenchman Unit as finally formulated and constructed differs from the project conceived in Bulletin No. 59 in the following respects:

1. Land use and acquisition for recreation and recreation development concepts were significantly expanded. The minimum pool of Frenchman Lake was established at 21,500 acre-feet, as compared with 500 acre-feet in Bulletin No. 59, in line with providing for additional recreational use. These modifications greatly increase the potential recreation and fish and wildlife enhancement benefits of the unit.

2. The estimates of the additional water supply created by the Frenchman Unit were significantly reduced. The operation studies of the unit, the results of which were presented in Bulletin No. 59, assumed streamflow conditions based upon two years of available record, which were extended by correlations with comparable nearby streams having long-term records for the period of operation study. Since those studies, additional records of streamflow of Little Last Chance Creek have been obtained and new correlations made. These new studies indicate a significant reduction in potential water supply benefits due to the unit.

4/ Department of Water Resources, Project Nomenclature Order No. 1, dated November 12, 1964.

5/ Department of Water Resources, "A Plan for the Development and Operation of Recreation Facilities at Frenchman Reservoir", dated March 1961.

The Department decided in the latter part of 1963 to revise the then existing allocation of project costs presented in Bulletin No. 59, to account properly for (1) the significant increase in estimated recreation and fish and wildlife benefits, (2) the decrease in estimated water supply benefits, and (3) the costs of lands, easements, rights-of-way, and relocation of public utilities not considered in the original allocation. On April 6, 1964, the Director of Water Resources approved a revised allocation of total project costs, on the basis of these revised criteria. This contained the following allocation of total costs among project purposes:

	Annual cost	Percent
Water supply	$31,850	35.8
Recreation and fish and wildlife enhancement	57,150	64.2
Total	$89,000	100.0

The development of this allocation is described in the following sections. Included are presentations of the revised estimates of benefits, the project costs of Bulletin No. 59, and the cost allocation computations on these bases.

Benefits

Benefits were reevaluated for the project purposes of water supply, based on irrigation use, and recreation and fish and wildlife enhancement. Although some incidental flood control benefits may accrue, the unit will not be operated for this purpose.

Water Supply. In accordance with the procedure described in Chapter IV, the water supply benefits which will accrue from the Frenchman Unit were estimated on the basis of the increase in net returns from farming operations brought about by operation of the unit. The period considered in analyzing the increase in net returns was the 50 years from 1962 to 2011. The scope of farming operations without the project during the 50-year period of analysis was based upon estimates of acreages that could have been beneficially irrigated by natural flows of Little Last Chance Creek during the 50-year period from 1914 through 1963. The farming practices assumed were those currently used in Sierra Valley.

The estimate of net returns from farming operations under project conditions was based on the estimated availability of irrigation water from the Frenchman Unit if it had been in operation during the period 1914 through 1963. The reservoir was assumed to be operated to yield a minimum of 5,000 acre-feet per year and a maximum of 12,000 acre-feet per year, producing an average supply over the 50 years of about 10,000 acre-feet. These water supply estimates were used to project annual irrigated acreages and in turn net agricultural income. It was predicted that full development of the land under project conditions would occur by the end of the first decade.

Based on the foregoing estimates of net returns from farming operations with and without the water supply features of the Frenchman Unit, the annual benefits from these features

were estimated. Table 7 summarizes the project benefits by decades and derives the total present worth of such benefits. As shown in that table, the water supply benefits of the Frenchman Unit are estimated to have an equal annual equivalent value of $46,500.

TABLE 7

WATER SUPPLY BENEFITS OF THE FRENCHMAN UNIT
(in dollars)

Decade	Total benefits	Present worth of benefits
1962-1971	194,900	160,200
1972-1981	619,400	344,000
1982-1991	619,400	232,300
1992-2001	619,400	157,000
2002-2011	619,400	106,000
Totals	2,672,500	999,500
Equal annual equivalent benefits at 4 percent interest for 50-year period, 1962-2011		46,500

Recreation and Fish and Wildlife Enhancement. An actual survey of trips by recreationists to Frenchman Lake was conducted during 1963. On the basis of those data and estimates of the growth of population in the area of California from which recreation visits to the unit will originate, the future annual visitor-day use was projected both with and without the Frenchman Unit. The results of these estimates for representative years, together with the projected increases due to the project, are given in Table 8.

TABLE 8

VISITOR-USE OF THE FRENCHMAN UNIT FOR RECREATION AND FISH AND WILDLIFE (in visitor days)

Calendar year	Nonproject conditions	Project conditions	Net increase due to project
1962	1,400	32,000	30,600
1963	1,500	61,000	59,500
1970	2,000	100,000	98,000
1980	3,000	127,000	124,000
1990	5,000	146,000	141,000
2000	6,000	167,000	161,000
2010	7,000	218,000	211,000

The projected land use for recreational purposes at Frenchman Lake based upon the visitor-use estimates with the project in operation, is shown on Plate 2.

The derivation of recreation and fish and wildlife benefits due to the Frenchman Unit was based on the visitor-use estimates illustrated in Table 8. The unit benefit from recreation and fish and wildlife enhancement was estimated to be $2.40 per visitor-day inclusive of both daytime and overnight usage. This unit value was applied to each annual value of the projected increase in visitor-day recreation use. Table 9 summarizes by decade the estimated total benefits and the present worths thereof. As shown in the table, the estimated equal annual equivalent value of recreation benefits is $272,300.

TABLE 9

RECREATION AND FISH AND WILDLIFE ENHANCEMENT BENEFITS OF THE FRENCHMAN UNIT
(in dollars)

Decade	Total benefits	Present worth of benefits
1962-1971	1,537,000	1,263,200
1972-1981	2,684,800	1,490,800
1982-1991	3,316,500	1,244,100
1992-2001	3,837,600	972,400
2002-2011	5,138,400	879,700
Totals	16,514,300	5,850,200
Equal annual equivalent benefits at 4 percent interest for 50-year period, 1962-2011.		272,300

Project Costs

The project costs of the Frenchman Unit, used for the cost allocation shown herein, were obtained largely from Bulletin No. 59. These are shown in Table 10.

TABLE 10

PROJECT COSTS OF THE FRENCHMAN UNIT
(in thousands of dollars)

Features	First costs	Equal annual equivalent costs at 3½% interest for 50-year period, 1962-2011		
		Capital	O.M.P. and R.*	Total
Features jointly used for project purposes				
Dam and reservoir	885.3	34.3	11.1	45.4
Lands, easements and relocations**	470.2	18.3	0	18.3
Subtotals	1,355.5	52.6	11.1	63.7
Specific recreation and enhancement features				
Structures	225.6	8.9	12.0	20.9
Lands, easements, and relocations**	113.5	4.4	0	4.4
Subtotals	339.1	13.3	12.0	25.3
TOTALS, FRENCHMAN UNIT	1,694.6	65.9	23.1	89.0

*All operation, maintenance, power, and replacement costs pertaining to water supply included in the minimum category.

**Items not considered in the original allocation contained in Bulletin No. 59.

Cost Allocation

The allocation of the total costs of the Frenchman Unit by the Separable Costs-Remaining Benefits Method, is shown in Table 11. The percentage distribution of total project costs among project purposes previously referred to, is derived in Step 9. The percentage distribution of the costs of features jointly used by project purposes is shown in Step 12.

TABLE 11

COST ALLOCATION
FOR THE FRENCHMAN UNIT

(in dollars unless otherwise noted)

Step no.	Item of benefit or cost*	Water supply	Recreation and fish and wildlife enhancement	Total
1.	Benefits	46,500	272,300	318,800
2.	Alternative Costs	46,300	71,600	117,900
3.	Justifiable Costs	46,300	71,600	117,900
4.	Separable Costs:			
	Total	17,400	42,700	60,100
	Capital	14,300	27,600	41,900
	O.M.P.&R.	3,100	15,100	18,200
5.	Remaining Justifiable Costs	28,900	28,900	57,800
6.	Percent Distribution of Remaining Justifiable Costs	50.0%	50.0%	100.0%
7.	Remaining Joint Costs:			
	Total	14,450	14,450	28,900
	Capital	12,000	12,000	24,000
	O.M.P.&R.	2,450	2,450	4,900
8.	Total Allocated Project Costs:			
	Total	31,850	57,150	89,000
	Capital	26,300	39,600	65,900
	O.M.P.&R.	5,550	17,550	23,100
9.	Percent Distribution of Total Project Costs:			
	Total	35.8%	64.2%	100.0%
	Capital	40.0%	60.0%	100.0%
	O.M.P.&R.	24.0%	76.0%	100.0%
10.	Specific Costs:			
	Total	0	25,300	25,300
	Capital	0	13,300	13,300
	O.M.P.&R.	0	12,000	12,000
11.	Total Allocated Costs of Features Jointly Used:			
	Total	31,850	31,850	63,700
	Capital	26,300	26,300	52,600
	O.M.P.&R.	5,550	5,550	11,100
12.	Percent Distribution of Costs of Features Jointly Used:			
	Total	50.0%	50.0%	100.0%
	Capital	50.0%	50.0%	100.0%
	O.M.P.&R.(Minimum Category)	50.0%	50.0%	100.0%

* Annual benefits and costs through the year 2011 converted to equivalent equal annual amounts for the 50-year period 1962-2011, at 4 percent and 3½ percent interest, respectively.

Upper Feather Division - Antelope Valley Unit

Antelope Valley Dam and Reservoir was designated in Bulletin No. 59, as a feature of the Indian Creek Recreation Project (now known as the Antelope Valley, Dixie Refuge, and Abbey Bridge Units of the Upper Feather Division). The following statement was made on page 104 of Bulletin No. 59 under the heading, "Cost Allocation":

> "It was considered that the recreation purposes and use of the Indian Creek Recreation Project would be of general statewide interest, and therefore, in accordance with the criteria adopted for this study, all costs of the project were assumed to be borne by the State and nonreimbursable."

Construction of Antelope Valley Dam commenced in August 1962, and was completed in July 1964. The reservoir it forms (now known as Antelope Lake[6/]) has essentially the same capacity and will be operated for the same purposes as considered in Bulletin No. 59. The projected land use for recreational purposes at Antelope Lake is shown on Plate 3.

Therefore, 100 percent of the total costs of the Antelope Valley Unit are allocated to the project purposes of recreation and fish and wildlife enhancement. This allocation does not require application of the Separable Costs-Remaining Benefits Method, specified in the water supply contracts for the allocation of costs of project conservation facilities located in and above the Delta, because these two purposes are considered to be one for this report, as stated in Chapter III.

6/ See Footnote No. 4.

CHAPTER VI. COST ALLOCATIONS FOR FACILITIES CURRENTLY UNDER CONSTRUCTION

Components of the State Water Project which are currently under construction and for which separate allocations are to be made are as follows:

1. The Grizzly Valley Unit of the Upper Feather Division.
2. The Oroville Division.
3. The California Aqueduct, divided into project conservation facilities and project transportation facilities.

The locations of these components, and major subdivisions thereof, are shown on Plate 1.

This chapter presents cost allocations for these three components of the Project. As indicated heretofore, the allocations for the California Aqueduct are preliminary. The areas in which the required data lack finality are described in the presentation of that allocation.

Upper Feather Division - Grizzly Valley Unit

The Director of Water Resources by executive order on October 14, 1958 modified the upstream features of the Feather River Project authorized by Section 11260 of the Water Code to conform with those shown in Bulletin No. 59. This action is referred to in Chapter V in connection with the Frenchman Unit.

Bulletin No. 59 presented two alternative Grizzly Valley Projects (now known as the "Grizzly Valley Unit of the Upper Feather Division"): (1) a proposed reservoir and system of works to regulate the waters of Big Grizzly Creek for irrigation usage in Sierra Valley and to form the basis for

enhancement of an outdoor recreation area and (2) a reservoir to form the basis for enhancement of an outdoor recreation area only.

The Director of Water Resources by executive order on January 17, 1964,[1/] further modified Water Code Section 11260. The order authorized the Grizzly Valley Unit for construction, including a dam and reservoir of approximately 83,000 acre-feet gross capacity, together with a pipeline extending for a distance of about six miles from the dam to the vicinity of Portola. This authorizing document specified that the unit shall be operated for recreational purposes and to provide a water supply for domestic and municipal usages and for downstream fisheries. It specifically provided that water supply for agricultural usages may be incorporated as a purpose of the unit at a later date. If this should occur, the cost allocation developed herein for the Grizzly Valley Unit will be revised.

The Department has completely revised the alternative cost allocations presented in Bulletin No. 59, following the modification of the unit by the aforesaid executive order. All items of benefit and cost entering into the allocation have been reevaluated.

Benefits

Benefits accounted for in the new cost allocation will accrue from the project purposes of water supply and recreation and fish and wildlife enhancement.

1/ Department of Water Resources, Project Order No. 6, dated January 17, 1964.

Water Supply. The calculation of water supply benefits for the Grizzly Valley Unit was based on domestic and municipal usages in the vicinity of Portola.

A water supply contract[2/] has been executed with Plumas County Flood Control and Water Conservation District, the territory of which includes the service area of the Grizzly Valley Unit. The present provisions of the contract call for an initial delivery of project water in 1967, building up to a maximum annual entitlement of 2,700 acre-feet in the year 2015.

Water supply benefits included in the cost allocations were attributed to the additional domestic and municipal uses which would not otherwise be possible without the Grizzly Valley Unit. The urban benefit was estimated on the basis of vendability to be $46.00 per acre-foot, the current cost of water to Portola.

The derivation of water supply benefits for the Grizzly Valley Unit is illustrated in Table 12.

2/ "Water Supply Contract between the State of California Department of Water Resources and Plumas County Flood Control and Water Conservation District", executed December 26, 1963.

TABLE 12

WATER SUPPLY BENEFITS OF GRIZZLY VALLEY UNIT

Calendar year	Project water delivery (acre-feet)	Water supply benefit (in dollars)
1967	250	11,500
1975	590	27,140
1985	890	40,940
1995	1,300	59,800
2005	1,880	86,480
2015	2,700	124,200
Equal annual equivalent benefits at 4% interest for the 50-year period 1965-2014:		41,800

Recreation and Fish and Wildlife Enhancement. The Recreation Development Plan for the Grizzly Valley Unit will be described in a forthcoming report[3/] of the Department. Pertinent features of the Recreation Land Use and Acquisition Plan for Grizzly Valley Reservoir, now known as Lake Davis,[4/] are shown on Plate 4.

Recreation and fish and wildlife enhancement benefits were taken as the direct benefits attributable to individuals who will visit the facilities at Lake Davis and who will fish downstream along Big Grizzly Creek. The average unit benefit

---

3/ Department of Water Resources Bulletin No. 128, "Advance Planning Report, Grizzly Valley Dam", currently scheduled for release early in 1965.

4/ Department of Water Resources, Project Nomenclature Order No. 1, dated November 12, 1964.

estimated for both daytime and overnight use at the Grizzly Valley Unit was estimated to be $2.25 per visitor-day.

The derivation of recreation and fish and wildlife enhancement benefits for the Grizzly Valley Unit is illustrated in Table 13.

TABLE 13

RECREATION AND FISH AND WILDLIFE ENHANCEMENT BENEFITS OF THE GRIZZLY VALLEY UNIT
(in visitor-days unless otherwise noted)

Calendar year	Nonproject conditions	Project conditions	Net increase due to project	Benefits based on $2.25 per visitor-day (in dollars)
1970	3,850	83,000	79,150	178,100
1980	5,150	134,000	128,850	289,900
1990	7,050	208,500	201,450	453,300
2000	10,100	325,200	315,100	708,900
2010	13,750	476,600	462,850	1,041,400
Equal annual equivalent benefits at 4% interest for the 50-year period 1965-2014:				388,900

Project Costs

The total costs of the Grizzly Valley Unit include those for:

1. Features jointly used for the purposes of water supply and recreation and fish and wildlife enhancement, including the dam, reservoir, road relocations, and land acquisitions.

2. Specific recreational features, including those for camping, picnicking, swimming, and boating at Lake Davis, and obtaining easements or titles to land to insure public access to downstream fisheries along Big Grizzly Creek and to provide parking areas and sanitary facilities near the stream at frequent intervals.

3. Specific water supply features consisting of a main transmission pipeline extending approximately six miles from the outlet of the dam to the vicinity of Portola.

The revised estimated costs of the Grizzly Valley Unit are summarized in Table 14. Estimated costs for the dam and reservoir were based on construction contract bid amounts.

TABLE 14

PROJECT COSTS OF THE GRIZZLY VALLEY UNIT
(in thousands of dollars)

Subdivisions of unit	First cost	Equal annual equivalent costs at 4% interest for 50-year period, 1965-2014		
		Capital	O.M.P. and R.*	Total
Features jointly used for project purposes	3,363.0	161.2	18.1	179.3
Specific recreation and fish and wildlife enhancement features**	3,353.0	84.9	51.5	136.4
Subtotal	6,716.0	246.1	69.6	315.7
Specific water supply features	463.0	21.6	3.5	25.1
TOTAL, GRIZZLY VALLEY UNIT	7,179.0	267.7	73.1	340.8

*All operation, maintenance, power, and replacement costs included in the minimum category with regard to water supply.

**Includes operation, maintenance, power and replacement costs of both initial features and future facilities construction of which will be staged over the 50-year period to accommodate progressive increases in recreational demand.

Cost Allocation

The allocation of costs among project purposes of the Grizzly Valley Unit is unique among those for the State Water Project, because this is the only facility located in and above the Delta that includes both project conservation facilities and project transportation facilities. The portions of the unit comprising project conservation facilities encompass both the features jointly used for project purposes and the specific recreation and fish and wildlife enhancement features located at Lake Davis and along the downstream reaches of Big Grizzly Creek. Specific water supply features of the unit, consisting of the pipeline from the dam to the vicinity of Portola, are included in the project transportation facilities in accordance with Article 45(c) of the water supply contract with the Plumas County Flood Control and Water Conservation District.

Costs of the project conservation facilities of the Grizzly Valley Unit must be allocated among project purposes by the Separable Costs-Remaining Benefits Method, in accordance with Article 22(e) of the water supply contracts. Costs of the project transportation facilities are totally allocable to the project purpose of water supply.

The cost allocations for the two types of facilities included in the Grizzly Valley Unit are thus independent from one another, except in the assigning of those portions of the

water supply benefits for the whole unit which are applicable to each. In accordance with the general procedures set forth in Chapter IV, water supply benefits were distributed between those facilities in proportion to the costs of such facilities allocated to the purpose of water supply.

The equal annual equivalent water supply benefit of $41,800, derived in Table 12, was apportioned between project conservation facilities and project transportation facilities of the Grizzly Valley Unit as follows:

Item	Project conservation facilities	Project transportation facilities	Total Grizzly Valley Unit
1. Costs allocated to water supply, in equal annual equivalents	$ 9,800	$25,100	$34,900
2. Percentages of total costs allocated to water supply	28.1%	71.9%	100.0%
3. Distribution of water supply benefits, in equal annual equivalents	$11,700	$30,100	$41,800

In the above derivation, the costs allocated to water supply for the project conservation facilities were first assumed and then verified by trial in subsequent cost allocations. The allocated cost of $9,800, finally assumed, is confirmed in the cost allocation of the Grizzly Valley Unit shown in Table 15.

TABLE 15

COST ALLOCATION
FOR THE GRIZZLY VALLEY UNIT

(in dollars unless otherwise noted)

Step no.	Item of benefit or cost*	Water supply	Recreation and fish and wildlife enhancement	Total
1	Benefits	11,700	388,900	400,600
2	Alternative Costs	60,800	315,700	376,500
3	Justifiable Costs	11,700	315,700	327,400
4	Separable Costs:			
	Total	0	254,900	254,900
	Capital	0	195,300	195,300
	O.M.P.&R.	0	59,600	59,600
5	Remaining Justifiable Costs	11,700	60,800	72,500
6	Percent Distribution of Remaining Jurtifiable Costs	16.1%	83.9%	100.0%
7	Remaining Joint Costs:			
	Total	9,100	51,000	60,800
	Capital	8,200	42,600	50,800
	O.M.P.&R	1,000	8,400	10,000
8a	Total Allocated Costs, Conservation Facilities:			
	Total	9,700	305,900	315,700
	Capital	7,800	237,900	245,100
	O.M.P.&R.	1,900	68,000	69,500
8b	Total Allocated Costs, Project Transportation Facilities:			
	Total	25,100	0	25,100
	Capital	21,600	0	21,600
	O.M.P.&R.	3,500	0	3,500
8c	Total Allocated Project Costs:			
	Total	34,900	305,900	340,800
	Capital	29,800	237,900	267,700
	O.M.P.&R.	5,100	68,000	73,100
9	Percent Distribution of Total Project Costs:			
	Total	10.2%	89.8%	100.0%
	Capital	11.1%	88.9%	100.0%
	O.M.P.&R.	7.0%	93.0%	100.0%
10.	Specific Costs:			
	Total	25,100	136,400	161,500
	Capital	21,600	84,900	106,500
	O.M.P.&R.	3,500	51,500	55,000
11	Total Allocated Costs of Features Jointly Used:			
	Total	9,800	169,500	179,300
	Capital	8,200	153,000	161,200
	O.M.P.&R.	1,600	16,500	18,100
12	Percent Distribution of Costs of Features Jointly Used:			
	Total	5.4%	94.6%	100.0%
	Capital	5.1%	94.9%	100.0%
	O.M.P.&R. (Minimum Category)	8.8%	91.2%	100.0%

*Annual benefits and costs through the year 2014 converted to equal annual equivalent amounts for the 50-year period 1965-2014 at 4 percent interest.

The computations shown through Step 8a. in Table 15 deal only with costs of the project conservation facilities. These costs are combined with the allocated costs of the project transportation facilities, shown in Step 8b., to form the total allocated costs of the Grizzly Valley Unit, shown in Step 8c. Otherwise, the cost allocation follows the general procedure set forth in Chapter IV. The final allocation percentages are shown in Step 12.

Oroville Division

The Oroville Division was first authorized by the Legislature[5/] in 1951 as part of the Feather River Project (now known as the "Feather River Facilities").

The Oroville Division is being constructed and will be operated for the project purposes of flood control, power generation, water supply, recreation, and fish and wildlife enhancement. The division will consist of: (1) features jointly used for project purposes, including Oroville Dam and Reservoir, Feather River Fish Hatchery and related works; (2) specific power features, including Oroville Powerplant, Thermalito Diversion Dam, Thermalito Power Canal, Thermalito Forebay, Thermalito Powerplant, Thermalito Afterbay, and related works; and (3) specific recreation and fish and wildlife enhancement features. Construction of the main embankment of Oroville Dam commenced in 1962, with completion scheduled in 1968.

A contract[6/] to provide for federal contribution of funds for the costs of the division allocated to the purpose of flood control was signed on March 8, 1962 by the United States of America, acting through the Department of the Army, and the State of California, acting through its Department of

---

5/ Calif. Stats. 1951, Ch. 1441, Water Code Sec. 11260.

6/ DA-04-167AVEng-62-56; DWR-152012

Water Resources. The Secretary of the Army transmitted a report[7/] to Congress on June 6, 1962, containing the complete record of the Federal Government's interest in, and approval of, the Oroville Division.

The terms of the contract provide for a total federal contribution equal to 22 percent of the actual construction cost of the features jointly used, but not to exceed $85,000,000 less actual federal costs of engineering and administration of the funds and less interest at three and one-half percent per annum on the actual federal expenditures during the construction period. The contribution so computed covers not only the construction costs of the Division allocated to flood control, but also a share of projected operation, maintenance, and replacement costs, capitalized at three and one-half percent per annum. Payments received to date by the Department under the terms of this contract total about $27,000,000.

The federal cost allocation for the Oroville Division, which is basic to the aforesaid percentage contained in the executed contract, considers the project purposes of flood control, water supply, which is divided between agricultural use and municipal and industrial use, and power generation. The purposes of recreation and fish and wildlife enhancement were not accounted for. At the time the allocation was made,

---

7/ H.D. No. 434, 87th Cong. 2nd Sess., dated June 18, 1962.

the Department of the Army was not required to assign project costs to those purposes, and the Department of Water Resources was not authorized to do so as such negotiations occurred before enactment of the Davis-Dolwig Act.

Negotiations commenced in July 1957. Data for the allocation were prepared by the U. S. Army Engineer District, Sacramento, in conjunction with the Department of Water Resources, the Bureau of Reclamation, and the Federal Power Commission. The allocation was made in accordance with federal procedures applicable at the time. The preliminary allocation submitted by the U. S. Army Engineer District, Sacramento was further modified by the Chief of Engineers, Department of the Army and by the Board of Engineers for Rivers and Harbors.

The following sections briefly describe the items of costs and benefits entering into the federal cost allocation and the allocation itself.

Benefits

All estimated annual benefits of the Oroville Division were estimated for the 50-year period of analysis, 1969 through 2018. These were converted to equal annual equivalent values at an interest rate of four percent.

Flood Control. The operation of Oroville Reservoir will provide a high degree of flood protection to the Cities of Oroville, Marysville, Yuba City, Live Oak, Gridley, and Biggs;

to numerous unincorporated communities; and to about 283,000 acres of rural land, much of which is intensively developed for fruit, nut and row crop production.

Flood control benefits creditable to Oroville Reservoir were computed by the U. S. Army District, Sacramento on the basis of projected conditions in the flood plain area during the period of analysis. Such conditions envision construction of flood control storage on the Yuba River in the near future. Flood control benefits accruing in the flood plain common to both streams were allocated between the streams in proportion to the amount of flood control storage required. The benefit computations were made by use of standard flow frequency and damage frequency methods. The price level used was July 1959. A summary of the flood control benefits creditable to Oroville Reservoir is given in Table 16:

TABLE 16

ESTIMATED FLOOD CONTROL BENEFITS OF THE OROVILLE DIVISION
(in dollars)

Feather River Reach No.	Description	Equal annual equivalent benefits
1	Oroville Dam site to Marysville (east bank)	$ 744,000
2	Reclamation District 10 (east bank)	68,000
3	Marysville (east bank)	180,000
6	Oroville to Sutter County line (west bank)	753,000
7	Sutter County line to Yuba City (west bank)	443,000
	Subtotal, Feather River above Yuba River	$2,188,000
4	Yuba River to Bear River (east bank)	229,000
5	Bear River to Natomas Cross Canal (east bank)	119,000
8	Yuba City and vicinity (west bank)	539,000
9	Yuba City to Sutter Bypass (west bank)	565,000
	Subtotal, Feather River below Yuba River	$1,452,000
	TOTAL	$3,640,000

Power Generation. Power generation credited to the power facilities of the Oroville Division were evaluated at the high voltage side of the hydro-plant transformers. The estimated generation in terms of dependable capacity, nondependable capacity, and energy, is shown in the following tabulation:

Applicable period	Dependable capacity (1,000 kw)	Nondependable capacity (1,000 kw)	Average annual energy (1,000,000 kw-hr)
1969-1972	464.0	40.8	1,954.6
1973-1975	685.2	11.0	2,751.5
1975-2018	685.1	10.0	2,519.3
Equal annual equivalent values for the 50-year period 1969-2018	650.4	15.6	2,454.9

Power benefits were evaluated as the annual costs of furnishing equivalent power at the load center from a privately financed steam-electric plant. Appropriate adjustments were made to reflect the benefits at the high voltage side of the hydro-plant transformers. The load center was considered to be 140 miles from the Oroville Division and 15 miles from the hypothetical location of the steam plant. Cost data for such alternative projects were developed by the San Francisco Regional Office of the Federal Power Commission in accord with standard practice. The principal basic data used in the computations are tabulated below:

Size of steam plant, kw	975,000
First cost, $ per kw	125
Fuel used, natural gas and oil	½ each
Efficiency, BTU's per kw-hr.	9,400
Equivalent cost of fuel. $/bbl.	2.20
Interest rate, percent	6.35
Federal, State, and local taxes, $/kw	6.30

The unit values for energy and capacity, measured at the Oroville Division site and developed as indicated above, are as follows:

Dependable capacity	$17.97/kw
Energy	3.06 mills/kw. hr.

No specific study was made of the value of nondependable capacity. The value of $4.20 per kilowatt suggested by the Pacific Gas and Electric Company was used.

The derivation of power generation benefits for the Oroville Division is illustrated in Table 17.

TABLE 17

POWER GENERATION BENEFITS OF THE OROVILLE DIVISION
(in thousands of dollars)

Applicable period	Dependable capacity	Non-dependable capacity	Average annual energy	Total annual benefit
1969-1972	8,338	171	6,000	14,509
1973-1975	12,313	46	8,420	20,779
1975-2018	12,311	42	7,709	20,062
Equal annual equivalent benefits for the 50-year period, 1969-2018	11,688	66	7,512	19,266

Water Supply. The water supply benefits creditable to the Oroville Division were estimated by the Department of Water Resources in 1959 predicated on the then contemplated scope of the State Water Project. Benefits associated with irrigation and municipal and industrial usages were computed separately in accordance with federal cost allocation procedures.

The estimated equal annual equivalent amount of water for irrigation usages supplied by the then Oroville Division over the 50-year period of analysis was estimated to be 308,500 acre-feet. Irrigation benefits creditable to the Oroville Division were estimated on the basis of the increase in net income to the service areas of the project brought about by the irrigation water, with an appropriate reduction for conveyance and drainage costs. The benefits so computed were

reviewed by personnel of the Bureau of Reclamation and the U. S. Army Engineer District, Sacramento and were found to be satisfactory for the cost allocation. Prices used in the computations were those estimated to have prevailed in 1959. The equal annual equivalent irrigation benefits creditable to the then Oroville Division, computed in the manner indicated above, amounted to $5,211,000.

The estimated equal annual equivalent amount of water for municipal and industrial usages that could be supplied by the then Oroville Division over the 50-year period of analyses was estimated to be 506,000 acre-feet. Municipal and industrial water supply benefits, in accordance with federal procedure, were taken as equal to the cost of water from the least expensive alternative single-purpose project capable of providing the same municipal and industrial supply as the multiple-purpose project. In the case of the Oroville Division, it was determined that the least costly alternative source would be a dam and reservoir with a capacity of 600,000 acre-feet at the Bidwell Bar site on the Middle Fork, Feather River. The annual cost of such a project was estimated to be $4,072,000; thus the equal annual equivalent benefits for municipal and industrial water supply were estimated to be $4,072,000.

Project Costs

The final federal cost allocation employed a discount rate of three and one-half percent which was a weighted average of the state and federal interest rates prevailing in 1962. These rates were four percent for the State and two and five-eighths percent for the Federal Government. The average rate mentioned above applied only to costs. As stated before, all benefits were discounted at a four percent interest rate in accordance with the Corps of Engineers' procedures.

Total project costs for the Oroville Division as considered in the federal allocation, included those for:

1. Facilities jointly used by all project purposes, including Oroville Dam and Reservoir, relocations, permanent housing and roads, fish hatchery, and related works.

2. Facilities required specifically for the purpose of power generation, including Oroville Powerplant, Thermalito Diversion Dam, Thermalito Power Canal, Thermalito Forebay, Thermalito Powerplant, Thermalito Afterbay, and related works.

Costs of specific recreation and fish and wildlife enhancement facilities were not considered in the federal allocation. They are accounted for in the portion of the cost allocation presented herein to demonstrate the current allocation of total project costs among purposes.

The recreation development plan for the Oroville Division has not as yet been completed. Consequently, the estimates of specific costs for recreation and fish and wildlife enhancement, included herein, are preliminary. Plate 5 presents the recreation land use plan for the Oroville Division.

The total estimated project costs of the Oroville Division, derived as explained above, are shown in Table 18.

TABLE 18

PROJECT COSTS OF THE OROVILLE DIVISION
(in thousands of dollars)

Features	First costs	Equal annual equivalent costs at 3.5% interest* for 50-year period, 1969-2018		
		Capital	O.M.P. and R.**	Total
Features jointly used for project purposes	300,398	14,599	614	15,213
Specific power features	156,232	7,593	3,671	11,264
Subtotal, costs included in federal allocation	456,630	22,192	4,285	26,477
Specific recreation and enhancement features	70,657	1,860	1,706	3,566
TOTAL, OROVILLE DIVISION	527,287	24,052	5,991	30,043

*Except for estimated equal annual equivalent costs of specific recreation and enhancement features which are based on 4% interest.

**All operation, maintenance, power, and replacement costs are included in the minimum category with respect to water supply. Value shown for specific power features is the cost of energy consumed in "pump-back" operation: average annual amount of 573,000 kilowatt-hours at 3.32 mills per kilowatt-hour.

Cost Allocation

The current cost allocation for the Oroville Division is presented in Table 19. The allocation of joint project costs among purposes shown thereon is derived from data in the federal cost allocation described previously in this section.

The specific costs of recreation and fish and wildlife enhancement facilities, shown in Step 7b, are included in the allocation of total project costs among purposes, shown in Step 8, to present a comprehensive picture.

A further special consideration in this cost allocation is an economic cost consisting of the federal, state and local taxes that would have been paid if the power features of the Oroville Division were constructed and operated by a private utility. Federal procedures in 1959 included such "taxes foregone" as a cost of the power purpose. This item is also shown in Step 7b of Table 19, in the amount of $4,098,000, which is subtracted from the capital costs allocated to power generation. Federal procedure has subsequently been revised to exclude consideration of taxes foregone.

The federal flood control contribution of 22 percent of the construction costs of the joint facilities of the Oroville Division may be derived from Step 11 of the cost allocation shown in Table 19. That percentage is the ratio of the total equal annual equivalent cost allocated to flood control ($3,206,000) to the total equal annual equivalent capital cost ($14,599,000).

On the basis of the construction costs of the features jointly used estimated in 1959 ($300,398,000) the total federal contribution for flood control would have been $66,000,000.

TABLE 19

COST ALLOCATION FOR THE OROVILLE DIVISION

(In thousands of dollars unless otherwise noted)

Step no.	Item of benefit or cost*	Flood control	Power generation	Water supply	Recreation and fish and wildlife enhancement	Total
1.	Benefits	3,640	19,266	9,284	-	32,190
2.	Alternative Costs	8,966	19,266	10,593	-	38,825
3.	Justifiable Costs	3,640	19,266	9,284	-	32,190
4.	Separable Costs:					
	Total	143	18,955	94	-	19,192
	Capital	137	15,041	83	-	15,261
	O.M.P.&R.	6	3,914	11	-	3,931
5.	Remaining Justifiable Costs	3,497	311	9,190	-	12,998
6.	Percent Distribution of Remaining Justifiable Costs	26.904%	2.393%	70.703%		100.00%
7a.	Remaining Joint Cost:					
	Total	3,063	272	8,048	-	11,383
	Capital	2,968	263	7,798	-	11,029
	O.M.P.&R.	95	9	250	-	354
7b.	Special Considerations, this Allocation:**					
	Total	0	-4,098	0	3,566	-532
	Capital	0	-4,098	0	1,860	-2,238
	O.M.P.&R.	0	0	0	1,706	1,706
8.	Total Allocated Project Costs:					
	Total	3,206	15,129	8,142	3,566	30,043
	Capital	3,105	11,206	7,881	1,860	24,052
	O.M.P.&R.	101	3,923	261	1,706	5,991
9.	Percent Distribution of Total Project Costs:					
	Total	10.7%	50.4%	27.0%	11.9%	100.0%
	Capital	12.9%	46.6%	32.8%	7.7%	100.0%
	O.M.P.&R.	1.7%	65.4%	4.4%	28.5%	100.0%
10.	Specific Costs:					
	Total	0	11,264	0	3,566	14,830
	Capital	0	7,593	0	1,860	9,453
	O.M.P.&R.	0	3,671	0	1,706	5,377
11.	Total Allocated Costs of Features Jointly Used:					
	Total	3,206	3,865	8,142	-	15,213
	Capital	3,105	3,613	7,881	-	14,599
	O.M.P.&R.	101	252	261	-	614
12.	Percent Distribution of Costs of Features Jointly Used:					
	Total	21.1%	25.4%	53.5%	-	100.0%
	Capital	21.3%	24.7%	54.0%	-	100.0%
	O.M.P.&R. (Minimum Category)	16.5%	41.0%	42.5%	-	100.0%

* Annual benefits and costs through the year 2018 converted to equal annual equivalents at 4 percent and 3½ percent, respectively for the 50-year period 1969-2018.

** As distinguished from other allocations included in this report the special considerations included in Step 7b are combined with the separable and remaining joint costs to form the total project costs. This step includes the following items:

(a) Cost allocation procedures at the time that the federal allocation was made included "taxes foregone" as a cost associated with the project purpose of power generation.

(b) The project purposes of recreation and fish and wildlife enhancement were excluded in the federal allocation of joint project costs. The estimated specific costs for these purposes are herein added to demonstrate the current distribution of total project costs to project purposes.

California Aqueduct

The California Aqueduct was originally authorized in 1951[8] as one of the Delta Diversion Projects included in a report of the State Water Resources Board of that year.[9] It was described as a "conduit to transport water from the Sacramento-San Joaquin Delta to the San Joaquin Valley and to Southern California". The aqueduct to Southern California was contemplated as being built on a high line route, similar to the current alignment, but it did not include features to serve the Central Coastal area. These additional features, comprising the Coastal Division of the California Aqueduct, were subsequently authorized for construction in 1959.[10]

The first construction contract for the California Aqueduct was awarded in November 1959. This was for the initial stage of Bethany Reservoir in the North San Joaquin Division. Construction of the aqueduct is scheduled so that deliveries to water supply contractors can commence in 1968 for those in the San Joaquin Valley, 1971 for those in Southern California to be served from the West Branch Division, and 1972

8/ Calif. Stats. 1951, Ch. 1441, Water Code Sec. 11260.

9/ State Water Resources Board, "Report on Feasibility of the Feather River Project and the Sacramento-San Joaquin Delta Diversion Projects Proposed as Features of the California Water Plan", dated May 1951.

10/ Department of Water Resources, Opinion of Chief Counsel No. 63-5, dated September 26, 1963.

for those in Southern California to be served from the East Branch Division. Initial deliveries from the Coastal Division to water supply contractors in the Central Coastal area are currently scheduled for 1980. This date may be advanced or delayed upon mutual agreement by the concerned contractors.

The California Aqueduct will be constructed and operated for the purposes of water supply, recreation and fish and wildlife enhancement.

The "Joint-Use Facilities of the San Luis Unit" will serve the purposes of water supply, recreation and fish and wildlife enhancement. Flood control will also be a purpose of the unit, but its costs will not enter the cost allocations for the California Aqueduct. Costs to be allocated by the United States to flood control will be deducted from total costs of the Joint-Use Facilities before the cost sharing ratios of the agreement described below are applied to obtain state contributions. The cost allocations derived herein apply only to the net state costs of the Joint-Use Facilities.

The San Luis Act[11/] authorized the Secretary of the Interior to construct the San Luis Unit of the Central Valley Project, and to enter into an agreement with the State of California with respect to the construction and operation of those facilities of the unit jointly used by the state and

---

11/ Act of June 3, 1960, Pub. L. 86-488, 74 Stat. 156.

federal projects. Such an agreement[12] between the State and the United States was executed on December 30, 1961. The agreement provides that the State and the United States shall share in the construction costs of the facilities jointly used in the respective proportions of 55 percent and 45 percent. This sharing agreement was negotiated from analyses of a series of cost allocations between the two entities based upon alternative methods and assumptions. The percentages of the agreement are not based on any one allocation. The formulae for sharing operating costs of the facilities jointly used are currently under negotiation.

Certain of the features of the California Aqueduct are classified in executed water supply contracts under the State Water Project as "project conservation facilities".[13] These facilities constitute a portion of the aqueduct extending from the Delta to and including an offstream reservoir near Los Banos in Merced County (San Luis Reservoir) to the extent required for the development of the minimum project yield. The project conservation facilities of the California Aqueduct are currently identified[14] as:

12/ Agreement between the United States of America and the Department of Water Resources of the State of California for the Construction and Operation of the Joint-Use Facilities of the San Luis Unit, executed December 30, 1961.

13/ Article 1(f) of "Standard Provisions for Water Supply Contract".

14/ Department of Water Resources "Bulletin No. 132-64, The California State Water Project in 1964", dated June 1964 (p. 176-178).

1. 23.04 percent of the aqueduct capacity from the Delta through Bethany Reservoir;

2. 23.49 percent of the aqueduct capacity from Bethany Reservoir to San Luis Forebay;

3. 100.00 percent of the State's share of San Luis Dam, Reservoir, and Pumping-Generating Plant of the San Luis Division; and

4. 45.64 percent of the State's share of the capacities of San Luis Forebay and the aqueduct from that feature to Mile 18 Pumping Plant.

The remaining aqueduct and reservoir capacities between the Delta and Mile 18 Pumping Plant, and the total capacities of the aqueducts from Mile 18 Pumping Plant through the termini of the East Branch, West Branch, and Coastal Divisions, are classified as "project transportation facilities".15/

As stated heretofore, the payment provisions of water supply contracts provide that the costs of the project which are reimbursable by water supply contractors shall be returned to the State, on the basis of the Delta Water Charge and the Transportation Charge.16/ The allocation of California Aqueduct costs among project purposes must therefore account separately for the project conservation facilities and the project transportation facilities.

The following sections describe the general procedure utilized for this report to develop the allocations of

---

15/ Article 1(i) of "Standard Provisions for Water Supply Contract".

16/ Articles 22(a) and 23 of the "Standard Provisions for Water Supply Contract".

the State's costs of features of the California Aqueduct jointly used for its purposes. An illustrative calculation of cost allocation percentages is presented on the basis of:

1. The estimated capacities and costs of the California Aqueduct as presented in the latest official analysis of the State Water Project by the Department contained in Bulletin No. 132-64.

2. Preliminary estimates of costs and benefits for only those specific recreation and fish and wildlife enhancement features where land acquisition for such purposes is currently authorized.

3. Assumptions as to the sharing with the Federal Government of the costs and benefits of specific recreation and fish and wildlife enhancement features located in the San Luis Division to obtain the net values for the State Water Project cost allocations.

The above items are subject to appreciable modification. The latest official analysis of the project does not reflect the recent increasing of the minimum project yield from 4,000,000 to 4,230,000 acre-feet annually, and the final project sizing criteria resulting therefrom.[17/] Water supply benefits estimated herein will increase due to this enlargement. Recreation and fish and wildlife enhancement features, in addition to those included herein, are currently being studied throughout the length of the aqueduct. Pyramid Reservoir has recently been added to the West Branch Division,[18/] and this will undoubtedly include recreation features. Negotiations with

---

17/ Department of Water Resources, Project Order No. 8, dated September 28, 1964.

18/ Department of Water Resources, Project Order No. 10, dated December 4, 1964.

federal agencies concerning the sharing of recreation and fish and wildlife enhancement costs in the San Luis Division have yet to be initiated.

Benefits

The benefits from project purposes of the State Water Project assignable to the California Aqueduct are those for water supply, recreation and fish and wildlife enhancement.

Water Supply. The general approach to the calculation of water supply benefits from the State Water Project, and the assignment of such benefits among physical components of the project, is described in Chapter IV. This approach considers that all water supply facilities of the State Water Project, except those of the Upper Feather Division, will be operated in a coordinated manner to form an integrated water supply project and will share the benefits derived in proportion to the costs of such facilities allocated to water supply.

The estimated water supply benefits of the State Water Project, exclusive of the Upper Feather Division, are presented in Table 20. The estimated benefits reflect service to water supply contractors contemplated on about January 1, 1964. The unit benefits applicable to each acre-foot of entitlement are for the most part those estimated during the formulation of the State Water Project. For example, a unit value for water supply applied to municipal and industrial usages in Southern California was based upon the then estimated minimum

future cost of demineralizing ocean water;[19] this being the estimated cost of water from the least expensive alternative source.

Derivation of the portion of the total water supply benefits assignable to the California Aqueduct is presented in Table 21. The water supply benefits and costs basic to the federal allocations of the costs of the Oroville Division, presented in this chapter, and of Del Valle Reservoir, to be described in Chapter VII, are shown to be deducted prior to the distribution of remaining water supply benefits. As shown in the table, assumed costs allocated to water supply, for facilities to be covered in future allocations, are tentative and subject to verification in future bulletins of this series.

Recreation and Fish and Wildlife Enhancement. Recreation and fish and wildlife enhancement features of the California Aqueduct considered in this report include those contemplated at the following sites:

1. Corral Hollow Fishing Access Site
2. Ingram Creek Aquatic Park
3. San Luis Reservoir and Forebay
4. Los Banos Detention Reservoir
5. Cedar Springs Reservoir
6. Perris Reservoir
7. Castaic Reservoir

The locations of these features are shown on Plate 1.

19/ Department of Water Resources Bulletin No. 78, "Investigation of Alternative Aqueduct Systems to Serve Southern California", dated December 1959.

TABLE 20

ILLUSTRATIVE TOTAL WATER SUPPLY BENEFITS
FROM FACILITIES OF THE STATE WATER PROJECT
EXCEPT THE UPPER FEATHER DIVISION

Service area	Maximum annual entitlements* (in acre-feet)	Equal annual equivalent entitlements** (in acre-feet)	Estimated unit net benefits (dollars per acre-foot)	Equal annual equivalent net benefits** (in thousands of dollars)
Feather River	35,800	16,160	10.00	162
North Bay	73,000	32,250	24.80	799
South Bay	194,000	161,340	38.00	6,131
San Joaquin Valley	1,362,500	835,700	39.00	32,587
Central Coastal	75,000	29,490	109.70	3,234
Southern California	2,257,000	1,334,610	144.00	192,180
TOTALS, STATE WATER PROJECT	3,997,300	2,409,550	97.57	235,093

* Existing or assumed as of January 1, 1964 (Bulletin No. 132-64) not including 2,700 acre-feet for the Upper Feather Division.

** Annual values through 2017, converted to equal annual equivalents for the 50-year period, 1968-2017, at 4 percent interest.

The recreation development plans have not been completed officially for any of the above sites. Land use and acquisition reports have been completed for all except items (1), (2) and (4). Emergency land use and acquisition reports have been made for items (1) and (2), and the Bureau of Reclamation is purchasing the land for item (4). The contemplated land use at San Luis Reservoir and Forebay, Cedar Springs Reservoir, Perris Reservoir, and Castaic Reservoir are shown on Plates 6, 7, 8, and 9, respectively.

A study of recreation potentials on the west side of the San Joaquin Valley was requested by Senate Resolution 54.[20] This resolution directed the Department of Water Resources, in cooperation with the California Departments of Fish and Game and of Parks and Recreation and with the Bureau of Reclamation, Department of the Interior, to evaluate the twenty-six water based recreation potentials included in the report entitled, "California's West Side Program",[21] which was submitted to the Legislature by the Administrator of The Resources Agency of California. The work has been accomplished through the joint efforts of those three state agencies, with the Bureau of Reclamation participating in studies in the area of the Joint-Use Facilities of the San Luis Unit. An advisory committee composed

---

20/ 1963 Calif. Senate Journal, p. 2936.

21/ The Resources Agency of California, The West Side Freeway and Aqueduct Recreation Development Committee, "California's West Side Program, Recreation, Land and Water Use Study", dated December 1962.

TABLE 21

ILLUSTRATIVE DERIVATION OF CALIFORNIA AQUEDUCT SHARE
OF TOTAL STATE WATER PROJECT WATER SUPPLY BENEFITS
(in thousands of dollars)

Item	Water supply benefits *	Costs allocable to water supply*
Estimated total for the State Water Project, not including the Upper Feather River Division	235,093	118,454
Portion of estimated total utilized in completed allocations:		
Oroville Division	9,284	8,142
South Bay Aqueduct-Del Valle Reservoir	409	212
Total, prior allocations	9,693	8,354
Remainder of estimated total for the State Water Project	225,400	110,100
Ratio of remaining water supply benefits to remaining costs allocable to water supply:		2.048:1
Distribution of remaining water supply benefits, based on estimated future allocations of costs to water supply:		
Delta Facilities	5,700	2,800***
Upper Eel River Development	1,600	800***
North Bay Aqueduct	1,200	600***
South Bay Aqueduct, exclusive of Del Valle Reservoir	8,200	4,000***
California Aqueduct:		
Delta to Mile 18 Pumping Plant	40,600	19,800**
Mile 18 Pumping Plant to termini	168,100	82,100**
Total, estimated future allocations	225,400	110,100

* Annual values through 2017, converted to an equal annual equivalent for the 50-year period, 1968-2017.

** Trial values verified by cost allocations in this chapter. Values are subject to the qualification in the third footnote.

*** Assumed approximate values based on total costs of these facilities given in Bulletin No. 132-64. These assumptions are subject to verification by cost allocations to be presented in future reports of this series.

of representatives of counties and state agencies having a direct interest in recreation development along the South San Joaquin Division of the California Aqueduct provided recommendations on water based recreation potentials. The results of this cooperative evaluation will be published in a report being prepared by the Department of Water Resources for presentation to the 1965 Regular Session of the Legislature.

The derivation of the estimated recreation and fish and wildlife enhancement benefits from the above-listed facilities is summarized in Table 22. The benefits shown for Cedar Springs, Perris, and Castaic Reservoirs, located in Southern California, are quite preliminary and are subject to revision. The benefits shown for San Luis Forebay and Reservoir and for Los Banos Detention Reservoir, in the San Luis Division, represent 55 percent of the total estimated benefit from each, assuming that sharing of such benefits will be in the same ratio as the sharing of costs under the San Luis Contract.

Project Costs

The costs of the California Aqueduct as considered in this report are summarized in Table 23.

The costs of features jointly used for purposes of water supply, recreation and fish and wildlife enhancement and costs of specific water supply features are based upon the latest official analysis of the project as presented in Bulletin No. 132-64. The values under the first heading of Table 23 show the division of costs of aqueduct reaches from

TABLE 22

ILLUSTRATIVE RECREATION AND FISH AND WILDLIFE BENEFITS
FROM THE CALIFORNIA AQUEDUCT

Specific recreation and fish and wildlife enhancement features	Unit benefits, in dollars per visitor-day		Annual values thru 2017, converted to equal annual equivalents for the 50-year period, 1968-2017, at 4% interest				
			Estimated use, in thousands of visitor-days		Recreation and fish and wildlife benefits in thousands of dollars (State share only)		
	Day use	Overnight use	Day use	Overnight use	Day use	Overnight use	Totals
Delta to Mile 18 Pumping Plant							
Corral Hollow Fishing Access Site	0.50	-	40	-	20	-	20
Ingram Creek Aquatic Park	1.25	-	298	-	373	-	373
San Luis Reservoir and Forebay	1.80	2.80	1,226	68	1,213	105	1,318
Los Banos Dentention Reservoir	0.50	2.60	97	137	27	196	223
Total, Delta to Mile 18 Pumping Plant	-	-	1,661	205	1,633	301	1,934
Mile 18 Pumping Plant to Termini							
Cedar Springs Reservoir	1.04	1.00	1,035	403	1,077	403	1,480
Perris Reservoir	1.36	1.00	3,095	129	4,209	129	4,338
Castaic Reservoir	1.39	1.00	1,234	369	1,715	369	2,084
Total, Mile 18 Pumping Plant to Termini	-	-	5,364	901	7,001	901	7,902
Total, Delta to Termini	-	-	7,025	1,106	8,634	1,202	9,836

the Delta to Mile 18 Pumping Plant between those for project conservation facilities and those for project transportation facilities based on data in Bulletin No. 132-64. These are totaled to obtain the weighted average proportionate use factor for each category of cost shown for the California Aqueduct from the Delta to Mile 18 Pumping Plant. These factors are shown in the eleventh and twelfth lines of the table.

As stated before, the costs of specific recreation and fish and wildlife enhancement features shown in this report are incomplete and are for illustrative purposes. The costs shown for those sites located within the San Luis Division represent 55 percent of the total estimated costs of each.

Cost Allocation

The allocation of the costs of the California Aqueduct between the project purposes of water supply and of recreation and fish and wildlife enhancement was accomplished in the following steps:

1. The costs of the features jointly used for project purposes from the Delta to Mile 18 Pumping Plant, which encompass the project conservation facilities, were allocated among project purposes by the Separable Costs-Remaining Benefits Method. This allocation accounted for specific recreation and fish and wildlife enhancement features located above Mile 18 Pumping Plant.

2. The allocated costs to reimbursable and nonreimbursable purposes were then distributed between the component project conservation facilities and project

TABLE 23

ILLUSTRATIVE PROJECT COSTS OF THE CALIFORNIA AQUEDUCT

(in thousands of dollars unless otherwise noted)

Subdivisions of the California Aqueduct	First costs	Equal annual equivalent costs for 50-year period, 1968-2017, at 4% interest: Capital costs	Operation, maintenance, power and replacement costs: Minimum	Variable	Totals
Features Jointly Used (basic to Bulletin No. 132-64)					
Delta to Mile 18 Pumping Plant					
North San Joaquin Division:					
Delta through Bethany Forebay:					
Project Conservation Facilities	13,181	638	115	595	710	1,348
Project Transportation Facilities	44,024	2,130	649	3,642	4,291	6,421
Bethany Forebay to San Luis Forebay:					
Project Conservation Facilities	18,803	924	277	0	277	1,201
Project Transportation Facilities	61,246	3,009	901	0	901	3,910
San Luis Division: (State share only)					
San Luis Forebay to Mile 18 Pumping Plant:					
Project Conservation Facilities	11,105	560	78	0	78	638
Project Transportation Facilities	13,227	667	92	0	92	759
San Luis Dam, Reservoir and Pumping-Generating Plant:					
Project Conservation Facilities	104,962	5,812	369	399	768	6,580
Project Transportation Facilities	0	0	0	0	0	0
TOTALS, DELTA TO MILE 18 PUMPING PLANT:					
Project Conservation Facilities	151,151	7,634	839	994	1,833	9,467
Project Transportation Facilities	118,497	5,806	1,642	3,642	5,284	11,090
Percent Distribution:					
Project Conservation Facilities	-	56.83%	33.82%	21.44%	25.76%	46.05%
Project Transportation Facilities	-	43.20%	66.18%	78.56%	74.24%	53.95%
Mile 18 Pumping Plant to Termini (Project Transportation Facilities only)						
San Luis Division below Mile 18 Pumping Plant (State share only)	90,486	4,517	1,307	2,508	3,775	8,292
South San Joaquin Division	395,537	9,272	2,282	10,796	13,078	22,950
Tehachapi Division	175,750	7,883	1,138	20,578	21,716	29,599
Antelope Division	27,450	1,243	853	(-) 463	(-) 210	1,033
East Branch Division	321,293	13,747	1,728	(-)1,217	505	14,252
West Branch Division	173,182	7,210	344	(-)3,553	(-)3,209	4,001
TOTAL, MILE 18 PUMPING PLANT TO TERMINI	989,657	44,372	7,506	28,549	36,055	80,027
Total Costs of Features Jointly Used, Delta to Termini						
Total, Project Conservation Facilities	151,151	7,634	839	994	1,833	9,467
Total, Project Transportation Facilities	1,108,354	50,078	9,648	31,991	41,639	91,717
	1,259,505	57,712	10,487	32,985	43,472	101,184
Specific Water Supply Features (basic to Bulletin No. 132-64)						
Delta to Mile 18 Pumping Plant	0	0	0	0	0	0
Mile 18 Pumping Plant to Termini:						
Coastal Division (Project Transportation Facilities)	53,539	1,877	1,239	512	1,751	3,628
Total Cost of Specific Water Supply Features, Delta to Termini	53,539	1,877	1,239	512	1,751	3,628
Specific Recreation and Fish and Wildlife Enhancement Features (as considered in this report)						
Delta to Mile 18 Pumping Plant						
Corral Hollow Fishing Access Site	70	3	14	0	14	17
Ingram Creek Aquatic Park	840	39	109	0	109	148
San Luis Forebay (State share only)	4,213	94	143	0	143	237
San Luis Reservoir (State share only)	8,362	120	179	0	179	299
Los Banos Detention Reservoir (State share only)	3,399	68	78	0	78	146
TOTAL, DELTA TO MILE 18 PUMPING PLANT	12,884	324	523	0	523	847
Mile 18 Pumping Plant to Termini						
Cedar Springs Reservoir	9,255	296	837	0	837	1,133
Perris Reservoir	10,140	404	1,372	0	1,372	1,776
Castaic Reservoir	13,680	415	918	0	918	1,333
TOTAL, MILE 18 PUMPING PLANT TO TERMINI	33,275	1,115	3,127	0	3,127	4,242
Total, Delta to Termini	46,159	1,439	3,650	0	3,650	5,089
TOTAL PROJECT COSTS (as considered in this report)						
Delta to Mile 18 Pumping Plant						
Features Jointly Used	269,648	13,440	2,481	4,636	7,117	20,557
Specific Water Supply Features	0	0	0	0	0	0
Specific Recreation and Fish and Wildlife Enhancement Features	12,884	324	523	0	523	847
TOTAL, DELTA TO MILE 18 PUMPING PLANT	282,532	13,764	3,004	4,636	7,640	21,404
Mile 18 Pumping Plant to Termini						
Features Jointly Used	989,857	44,372	7,506	28,549	36,055	80,027
Specific Water Supply Features	53,539	1,877	1,239	512	1,751	3,628
Specific Recreation and Fish and Wildlife Enhancement Features	33,275	1,115	3,127	0	3,127	4,242
TOTAL MILE 18 PUMPING PLANT TO TERMINI	1,076,671	47,364	11,872	29,061	40,933	88,297
Total, Delta to Termini	1,359,203	61,128	14,876	33,697	48,473	109,501

transportation facilities by the Proportionate Use of Facilities Method.

3. The portions of reimbursable and nonreimbursable costs assigned to project transportation facilities in (2) above were combined with similar costs resulting from an allocation of the costs of project transportation facilities located below Mile 18 Pumping Plant by the Alternative Justifiable Expenditure Method. The latter allocation accounted for specific recreation and fish and wildlife features located below Mile 18 Pumping Plant.

Items (1) and (2) above are combined in the allocation of the costs of facilities from the Delta to Mile 18 Pumping Plant presented in Table 24. This table develops, by the Separable Costs-Remaining Benefits Method, the allocated costs of features jointly used, shown in Step 11. It then allocates these costs between project conservation facilities and project transportation facilities by the percentages derived in Table 23, as shown in Steps 13 and 14, respectively. The percentages applicable for the allocation of the costs of the project conservation facilities among project purposes are developed in Step 12.

The cost allocation for project transportation facilities located downstream from Mile 18 Pumping Plant by the Alternative Justifiable Expenditure Method is presented in Table 25. The results of this allocation of costs of features jointly used for project purposes are shown in Step 11a. These costs are combined with those assigned to project transportation facilities in Table 24, shown in Step 11b, to compute the total allocation of costs of the project transportation facilities from the Delta to the termini of the

TABLE 24

ILLUSTRATIVE COST ALLOCATION FOR THE CALIFORNIA AQUEDUCT
DELTA TO MILE 18 PUMPING PLANT

(in thousands of dollars unless otherwise noted)

Step no.	Item of benefit or cost*	Water supply	Recreation and fish and wildlife enhancement	Total
Total Project Costs: Delta to Mile 18 Pumping Plant				
1	Benefits (State only)	40,600	1,900	42,500
2	Alternative Costs	20,400	2,500	22,900
3	Justifiable Costs	20,400	1,900	22,300
4	Separable Costs:			
	Total	18,900	1,000	19,900
	Capital	12,100	400	12,500
	O.M.P.&R.	6,800	600	7,400
5	Remaining Justifiable Costs	1,500	900	2,400
6	Percent Distribution of Remaining Justifiable Costs	62.5%	37.5%	100.0%
7	Remaining Joint Costs:			
	Total	900	600	1,500
	Capital	800	500	1,300
	O.M.P.&.R.	100	100	200
8	Total Allocated Project Costs:			
	Total	19,800	1,600	21,400
	Capital	12,900	900	13,800
	O.M.P.&R.	6,900	700	7,600
9	Percent Distribution of Total Project Costs:			
	Total	92.5%	7.5%	100.0%
	Capital	93.5%	6.5%	100.0%
	O.M.P.&.R.	90.8%	9.2%	100.0%
10	Specific Costs, This Allocation:			
	Total	4,600	800	5,400
	Capital (Specific Features)	0	300	300
	O.M.P.&R. (Specific Features)	0	500	500
	Variable O.M.P.&R. (Joint Features)	4,600	-	4,600
11	Allocated Costs of Features Jointly Used:			
	Total, Excluding Variable O.M.P.&R.	15,200	800	16,000
	Capital	12,900	600	13,500
	Minimum O.M.P.&R.	2,300	200	2,500
12	Percent Distribution of Costs of Features Jointly Used:**			
	Total, Excluding Variable O.M.P.&R.	95.0%	5.0%	100.0%
	Capital	95.6%	4.4%	100.0%
	Minimum O.M.P.&R.	92.0%	8.0%	100.0%
Project Conservation Facilities				
13	Allocated Costs of Features Jointly Used:***			
	Total, Excluding Variable O.M.P.&R.	8,100	400	8,500
	Capital	7,300	300	7,600
	Minimum O.M.P.&R.	800	100	900
Project Transportation Facilities				
14	Allocated Costs of Features Jointly Used***			
	Total, Excluding Variable O.M.P.&R.	7,100	400	7,500
	Capital	5,600	300	5,900
	Minimum O.M.P.&R.	1,500	100	1,600

* Annual benefits and costs through the year 2017 converted to equal an annual equivalents for the 50-year period, 1968-2017, at 4% interest. Steps 1 through 12 comprise the Separable Costs-Remaining Benefits Method and steps 13 and 14 express the Proportionate Use of Facilities Method.

** Constituting also the percent distribution of allocated costs of features jointly used in the project conservation facilities of the California Aqueduct.

*** Distributed by the percentages developed under the first heading of Table 23.

California Aqueduct shown in Step 11c. The percentages applicable to the allocation of costs of the project transportation facilities among purposes is shown in Step 12.

Three important considerations reflected in these illustrative allocations are:

1. As indicated before, the allocations do not include the benefits and costs of the federal Central Valley Project and assume that the United States will share in the costs of specific recreation facilities of the San Luis Division and will share in the nonreimbursable benefits derived therefrom in proportion to the percentages set forth in the San Luis Contract for the sharing of construction costs.

2. The alternative costs normally evaluated in Step 2 were omitted from the allocation shown in Table 25. It was tentatively assumed that alternative costs will exceed project benefits and as such will not affect the allocation.

3. In the final determination of percentages for the allocation of joint operating costs among purposes, both variable operating costs and specific costs were deducted in Step 11c. This deduction of variable costs permits the annual allocation of actual operating costs in that category based upon actual annual delivery requirements in accordance with the Standard Provisions for Water Supply Contract.

The illustrative allocations of the joint costs of the California Aqueduct among purposes and between project conservation facilities and project transportation facilities, derived in Steps 12 of Tables 24 and 25, are summarized as follows:

Item	Water supply	Recreation & fish & wildlife enhancement	Total
Conservation Facilities:			
Capital costs	95.6%	4.4%	100.0%
Minimum O.M.P.&R. costs	92.0%	8.0%	100.0%
Transportation Facilities:			
Capital costs	97.4%	2.6%	100.0%
Minimum O.M.P.&R. costs	90.3%	9.7%	100.0%

TABLE [illegible]

ILLUSTRATIVE COST ALLOCATION FOR THE CALIFORNIA AQUEDUCT
MILE 18 PUMPING PLANT TO TERMINI

(in thousands of dollars unless otherwise noted)

Step no.	Item of benefit or cost*	Water supply	Recreation and fish and wildlife enhancement	Total
	Project Transportation Facilities: Mile 18 Pumping Plant to Termini			
1	Benefits	168,100	7,900	176,000
2	Alternative Costs	-	-	-
3	Justifiable Costs	168,100	7,900	176,000
4	Specific Costs:			
	Total	3,600	4,200	7,800
	Capital	1,900	1,100	3,000
	O.M.P.&R	1,700	3,100	4,800
5	Remaining Justifiable Costs	164,500	3,700	168,200
6	Percent Distribution of Remaining Justifiable Costs	97.[illegible]%	2.2%	100.0%
7	Remaining Joint Costs:			
	Total	78,[illegible]	1,[illegible]	[illegible],300
	Capital	43,[illegible]	1,[illegible]	44,[illegible]
	O.M.P.&R.	35,[illegible]	[illegible]	3[illegible]
8	Total Allocated Project Costs:			
	Total	82,100	6,000	88,100
	Capital	45,200	2,100	47,300
	O.M.P.&R.	36,900	3,900	40,800
9	Percent Distribution of Total Project Costs:			
	Total	93.2%	6.8%	100.0%
	Capital	95.6%	4.4%	100.0%
	O.M.P.&R.	90.4%	9.6%	100.0%
10	Specific Costs, This Allocation:			
	Total	31,[illegible]	4,200	36,100
	Capital (Specific Features)	1,900	1,100	3,000
	O.M.P.&R. (Specific Features)	1,700	3,100	4,800
	Variable O.M.P.&R. (Joint Features)	2[illegible],300	-	28,300
11a	Allocated Costs of Features Jointly Used:			
	Total, excluding Variable O.M.P.&R.	50,200	1,800	52,000
	Capital	43,300	1,000	44,300
	Minimum O.M.P.&R.	6,900	800	7,700
	Project Transportation Facilities: Delta to Mile 18 Pumping Plant			
11b	Allocated Costs of Features Jointly Used:**			
	Total, excluding Variable O.M.P.&R.	7,100	[illegible]	7,500
	Capital	5,600	[illegible]	5,[illegible]
	Minimum O.M.P.&R.	1,[illegible]	100	1,[illegible]
	Project Transportation Facilities: Delta to Termini			
11c	Allocated Costs of Features Jointly Used:			
	Total, excluding Variable O.M.P.&R.	57,3[illegible]	[illegible],200	59,[illegible]
	Capital	4[illegible],900	1,300	50,2[illegible]
	Minimum O.M.P.&R.	[illegible],40[illegible]	[illegible]	[illegible],30[illegible]
12	Percent Distribution of Costs of Features Jointly Used:			
	Total, excluding Variable O.M.P.&R.	96.3%	3.7%	100.0%
	Capital	97.[illegible]%	[illegible]	100.0%
	Minimum O.M.P.&R.	[illegible].3%	[illegible].7%	100.0%

* Steps 1 through 11a comprise the Alternative Justifiable Expenditure Method.
** From Step 14, Table 24.

CHAPTER VII. COST ALLOCATIONS FOR FACILITIES WITH INITIAL CONSTRUCTION IN 1965-66

The timing of the initial allocation of costs of the South Bay Aqueduct, shown in Table 4, is predicated upon the construction of Del Valle Dam and Reservoir, the major multiple-purpose component thereof. The work of building that component is scheduled to be initiated in 1965-66.

Construction of the North Bay Aqueduct is also scheduled to commence in 1965-66 for the reach from and including Cordelia Pumping Plant to the Napa Terminus. This facility is not shown in Table 4, since specific recreation and fish and wildlife enhancement features are not contemplated currently in connection therewith. If they are added in the future, cost allocations will be prepared at that time.

The cost allocations described in this chapter are for Del Valle Dam and Reservoir of the South Bay Aqueduct only. The location of that feature is shown on Plate 1.

South Bay Aqueduct

The South Bay Aqueduct was originally authorized as part of the Feather River Project in 1951.[1/] It was described in the State Water Resources Board report of that year[2/] as a "conduit to transport water from the Sacramento-San Joaquin Delta to Santa Clara and Alameda Counties".

1/ California Stats. 1951, Ch. 1441, Water Code Sec. 11260.

2/ State Water Resources Board, "Report on Feasibility of the Feather River Project and the Sacramento-San Joaquin Delta Diversion Projects Proposed as Features of the California Water Plan", dated May 1951.

The Director of Water Resources by executive order on October 14, 1958,[3] established that the conduit would be known as the South Bay Aqueduct, would include Del Valle Reservoir, and would also include a North Livermore Valley branch aqueduct and Doolan Canyon Reservoir. A similar order by the Director on March 26, 1959,[4] provided that the South Bay Aqueduct would terminate at Airpoint Reservoir. Airpoint Reservoir subsequently was deleted as a feature of the South Bay Aqueduct and the aqueduct was extended to a terminal point in Santa Clara County near Penitencia Creek by executive order on August 19, 1963.[5] Elimination of Airpoint Reservoir followed a detailed geologic exploration at the damsite which disclosed adverse foundation conditions that would have substantially increased the cost of the dam. Doolan Canyon Reservoir and its associated branch conduit, while still authorized features of the South Bay Aqueduct, are not scheduled for construction at this time.

Construction commenced on the South Bay Aqueduct with the award of the initial contract in November 1959. All "main-line" features of the aqueduct from the Delta-Mendota Canal to Penitencia Creek were either completed or under construction in 1964 with completion of all such features scheduled

---

3/ Department of Water Resources, Project Order No. 2, dated October 14, 1958.

4/ Department of Water Resources, Project Order No. 3, dated March 26, 1959.

5/ Department of Water Resources, Project Order No. 5, dated August 19, 1963.

for 1965. Initial construction activities on Del Valle Dam and Reservoir, and on the associated pumping plant and pipeline connection with the main aqueduct, are scheduled for late in calendar year 1965, with completion in 1967.

Del Valle Dam and Reservoir are currently the only features of the South Bay Aqueduct which will directly accommodate purposes other than water supply. While recreation and fish and wildlife enhancement facilities have been considered along the main aqueduct, none have been formulated. Del Valle Reservoir will be operated for the project purposes of flood control, water supply, recreation and fish and wildlife enhancement.

In March 1961 the Division Engineer, U. S. Army Engineer Division, South Pacific, submitted a report[6/] to the Chief of Engineers, Department of the Army, including a cost allocation for Del Valle Dam and Reservoir among the purposes of flood control and water supply only. The Board of Engineers for Rivers and Harbors in reviewing the District's report, revised the allocation to include the purpose of recreation.[7/] The revised allocation utilized benefits and costs estimated by the Corps of Engineers, and indicated the following distribution of project costs among the purposes of flood control, water supply and recreation:

6/ U. S. Army Engineer District, San Francisco, Corps of Engineers, "Review Report on Alameda Creek, California for Flood Control and Allied Purposes", dated March 1961.

7/ Report of the Board of Engineers for Rivers and Harbors to the Chief of Engineers, Dept. of the Army, subject: "Alameda Creek, California" dated November 13, 1961.

	First costs	Percent of distribution
Flood control	$4,070,000	32.9
Water supply	4,840,000	39.1
Recreation	3,460,000	28.0
Total	$12,370,000	100.0

The Department reviewed this allocation, and in its comments to the Chief of Engineers,[8] generally concurred in the results with certain reservations as to the amount of the federal contribution for the costs allocated to the purpose of flood control. The Department's views with regard to the magnitude of the contribution were largely incorporated in the recommendations of the revised report.

The revised report, dated August 16, 1962, together with pertinent correspondence and reports, was transmitted from the Secretary of the Army to the Chairman of the Senate Committee on Public Works, on September 7, 1962.[9]

Congress has authorized[10] a federal contribution of costs allocable to flood control substantially in accordance with the above report. The approved formula provides that the United States will advance 30.7 percent of actual construction costs of Del Valle Dam and Reservoir, up to a limit of $4,080,000; plus $776,000 for a capitalized share of annual operating costs; and with the Federal Government to bear its costs for engineering, general expense, and administration, estimated to be $270,000.

8/ Letter to Lieutenant General Walter K. Wilson, Jr., Chief of Engineers, Department of the Army, from Mr. William E. Warne, Director, Department of Water Resources, dated March 23, 1962.

9/ Senate Document No. 128, 87th Congress, 2nd Session.

10/ Section 203 of the Flood Control Act of 1962, 76 Stat. 1173.

Derivation of the proposed 30.7 percent flood control contribution from the 32.9 percent share of first costs, shown by the cost allocation to be allocated to the purpose of flood control, is presented in the following computation:

Total first costs of features jointly used allocated to flood control:	
32.9% x $12,370,000 =	$4,070,000
less federal engineering and design costs included in total . . .	70,000
less federal supervision and administration costs included in total . . .	200,000
Estimated federal cash contribution . . .	$3,800,000

Estimated federal cash contribution in percent of first costs of features jointly used . . .

$$\frac{\$\ 3,800,000}{\$12,370,000} \times 100\% = 30.7\%$$

The Department is essentially in agreement with the terms of the proposed contract, except with regard to the ceiling of $4,080,000 on federal contributions. This matter is under consideration by the Department and the U. S. Army Engineer District, San Francisco.

As stated in Chapter III, Article 22(e) of the water supply contracts provides with respect to conservation facilities that "allocations to purposes the costs of which are paid by the United States shall be as determined by the United States". This principle is extended herein to include Del Valle Dam and Reservoir, a project transportation facility. The cost allocation by the Board of Engineers for Rivers and Harbors represents the current determination by the United States of the allocation

among purposes of this facility. This allocation, together with the major benefits and project costs basic to it, is briefly described in the following sections.

Benefits

The annual benefits from Del Valle Dam and Reservoir were estimated by the Corps of Engineers based upon a 50-year period of analysis commencing with the initial year of operation of the reservoir. The federal interest rate of two and five-eighths percent per annum, which prevailed at the time of the allocation, was assumed.

Flood Control. Derivation of the estimated equal annual equivalent flood control benefits is summarized in Table 26.

TABLE 26

FLOOD CONTROL BENEFITS FROM DEL VALLE DAM AND RESERVOIR
(in dollars)

1. Annual reduction in downstream improvement costs:	
a. Channel construction	72,300
b. Lands and relocations	25,300
c. Loss in land productivity	7,800
d. Operation, maintenance, and replacement	21,000
Subtotal	126,400
2. Annual reduction in flood damage:	
a. Arroyo Del Valle	23,000
b. Arroyo de la Laguna	21,000
c. Niles Canyon	70,000
Subtotal	114,000
TOTAL, EQUAL ANNUAL EQUIVALENT FLOOD CONTROL BENEFITS	240,400

Water Supply. Water supply benefits were measured as the costs of a single-purpose alternative project, located at the Del Valle site, which would be operated solely for the purpose of water supply. The required gross capacity of the single-purpose reservoir was estimated to be 40,000 acre-feet, including 10,000 acre-feet for silt deposition. The estimated equal annual equivalent costs of the single-purpose reservoir are as follows:

Recovery of estimated capital costs ($9,460,000) in 50-years at 2-5/8% interest	$341,900
Annual operation, maintenance, and replacement costs	65,000
Annual loss in land productivity due to the project	1,600
Total, annual water supply benefits as measured by alternative costs	$408,500

Recreation and Fish and Wildlife Enhancement. In its report to the Chief of Engineers, the Board of Engineers for Rivers and Harbors noted that extensive use of the local recreational opportunities which would be provided by Del Valle Reservoir was anticipated. It estimated these benefits, limited by the costs of providing equal recreational opportunities by other means, at $566,000 annually.

The Department's Recreation Land Use and Acquisition Plan for Del Valle Reservoir is shown on Plate 10.

Project Costs

Project costs of Del Valle Dam and Reservoir were estimated by the Corps of Engineers based upon a reservoir having a gross capacity of 74,000 acre-feet, including a flood control

reservation of 35,000 acre-feet, and based upon unit construction costs prevailing in 1959. Annual costs were computed at two and five-eighths percent interest for the initial 50-year period of operation. The estimated costs of Del Valle Dam and Reservoir utilized in the federal cost allocation are summarized in Table 27.

TABLE 27

PROJECT COSTS OF DEL VALLE DAM AND RESERVOIR
(in thousands of dollars)

Item of cost	First costs	Equal annual equivalent costs at 2-5/8% interest for the initial 50-year period of operation		
		Capital	O.M.P.&R.*	Totals
Features jointly used for project purposes				
Dam, reservoir, rights-of-way, and relocations	12,370	447	246	693
Specific recreation and fish and wildlife enhancement facilities	2,000	72	0	72
Additional specific costs				
Federal preauthorization studies:				
Flood control	30	1	0	1
Loss in land productivity:				
Flood control	0	0	1	1
Water supply	0	0	1	1
Recreation and fish and wildlife enhancement	0	0	1	1
TOTAL, DEL VALLE DAM AND RESERVOIR	14,400	520	249	769

* All operation, maintenance, power, and replacement costs included in the minimum category with respect to water supply.

Water Supply. Water supply benefits were measured as the costs of a single-purpose alternative project, located at the Del Valle site, which would be operated solely for the purpose of water supply. The required gross capacity of the single-purpose reservoir was estimated to be 40,000 acre-feet, including 10,000 acre-feet for silt deposition. The estimated equal annual equivalent costs of the single-purpose reservoir are as follows:

Recovery of estimated capital costs ($9,460,000) in 50-years at 2-5/8% interest	$341,900
Annual operation, maintenance, and replacement costs	65,000
Annual loss in land productivity due to the project	1,600
Total, annual water supply benefits as measured by alternative costs	$408,500

Recreation and Fish and Wildlife Enhancement. In its report to the Chief of Engineers, the Board of Engineers for Rivers and Harbors noted that extensive use of the local recreational opportunities which would be provided by Del Valle Reservoir was anticipated. It estimated these benefits, limited by the costs of providing equal recreational opportunities by other means, at $566,000 annually.

The Department's Recreation Land Use and Acquisition Plan for Del Valle Reservoir is shown on Plate 10.

Project Costs

Project costs of Del Valle Dam and Reservoir were estimated by the Corps of Engineers based upon a reservoir having a gross capacity of 74,000 acre-feet, including a flood control

reservation of 35,000 acre-feet, and based upon unit construction costs prevailing in 1959. Annual costs were computed at two and five-eighths percent interest for the initial 50-year period of operation. The estimated costs of Del Valle Dam and Reservoir utilized in the federal cost allocation are summarized in Table 27.

TABLE 27

PROJECT COSTS OF DEL VALLE DAM AND RESERVOIR
(in thousands of dollars)

Item of cost	First costs	Equal annual equivalent costs at 2-5/8% interest for the initial 50-year period of operation		
		Capital	O.M.P.&R.*	Totals
Features jointly used for project purposes				
Dam, reservoir, rights-of-way, and relocations	12,370	447	246	693
Specific recreation and fish and wildlife enhancement facilities	2,000	72	0	72
Additional specific costs				
Federal preauthorization studies:				
Flood control	30	1	0	1
Loss in land productivity:				
Flood control	0	0	1	1
Water supply	0	0	1	1
Recreation and fish and wildlife enhancement	0	0	1	1
TOTAL, DEL VALLE DAM AND RESERVOIR	14,400	520	249	769

* All operation, maintenance, power, and replacement costs included in the minimum category with respect to water supply.

Cost Allocation

The cost allocation for Del Valle Dam and Reservoir, derived from Senate Document 128 and presented in the format used in this report, is given in Table 28. The specific costs shown in Step 10 include (1) the costs of federal preauthorization studies, assigned to the purpose of flood control and (2) costs due to loss of land productivity resulting from the construction of project works assigned equally to each of the three purposes. The results of the allocation of costs of Del Valle Dam and Reservoir among project purposes is shown in Step 12 of Table 28.

TABLE 28

COST ALLOCATION FOR DEL VALLE DAM AND RESERVOIR

(in thousands of dollars
unless otherwise indicated)

Step no.	Item of benefit or cost*	Flood control	Water supply	Recreation and fish and wildlife enhancement	Total
1.	Benefits	240	-	-	-
2.	Alternative Costs	-	409	566	-
3.	Justifiable Costs	240	409	566	1,215
4.	Separable Costs:				
	Total	128	57	232	417
	Capital	107	44	72	223
	O.M.P.&R.	21	13	160	194
5.	Remaining Justifiable Costs:	112	352	334	798
6.	Percent Distribution of Remaining Justifiable Costs	14%	44%	42%	100%
7.	Remaining Joint Costs:				
	Total	49	155	148	352
	Capital	42	132	126	300
	O.M.P.&R.	7	23	22	52
8.	Total Allocated Project Costs:				
	Total	177	212	380	769
	Capital	149	176	198	523
	O.M.P.&R.	28	36	182	246
9.	Percent Distribution of Total Project Costs:				
	Total	23.0%	27.6%	49.4%	100.0%
	Capital	28.5%	33.6%	37.9%	100.0%
	O.M.P.&R.	11.4%	14.6%	74.0%	100.0%
10.	Specific Costs; This Allocation:				
	Total	2	1	73	76
	Capital	2	1	73	76
	O.M.P.&R.	0	0	0	0
11.	Total Allocated Costs of Features Jointly Used:				
	Total	175	211	307	693
	Capital	147	175	125	447
	O.M.P.&R	28	36	182	246
12.	Percent Distribution of Costs of Features Jointly Used:				
	Total	25.3%	30.4%	44.3%	100.0%
	Capital	32.9%	39.1%	28.0%	100.0%
	O.M.P.&R. (Minimum Category)	11.4%	14.6%	74.0%	100.0%

* Items of benefits and costs converted to equal annual equivalents for the initial 50-year period of reservoir operation at 2-5/8 percent interest.

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

LOCATION OF FACILITIES

THE CALIFORNIA STATE WATER PROJECT

Underlined facilities denote those included in the cost allocations of this report

SCALE OF MILES
40 0 40 80 120

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

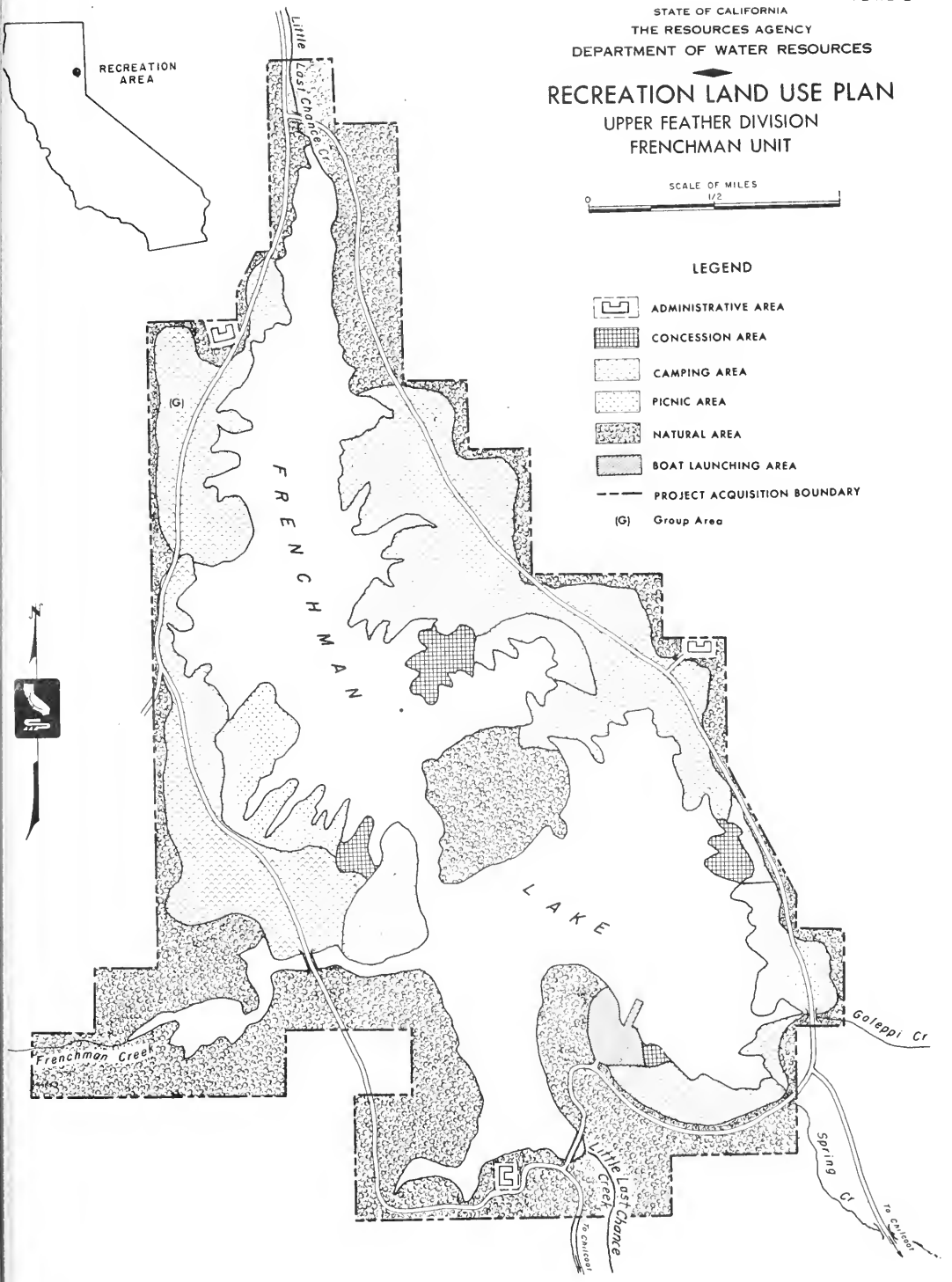
RECREATION LAND USE PLAN

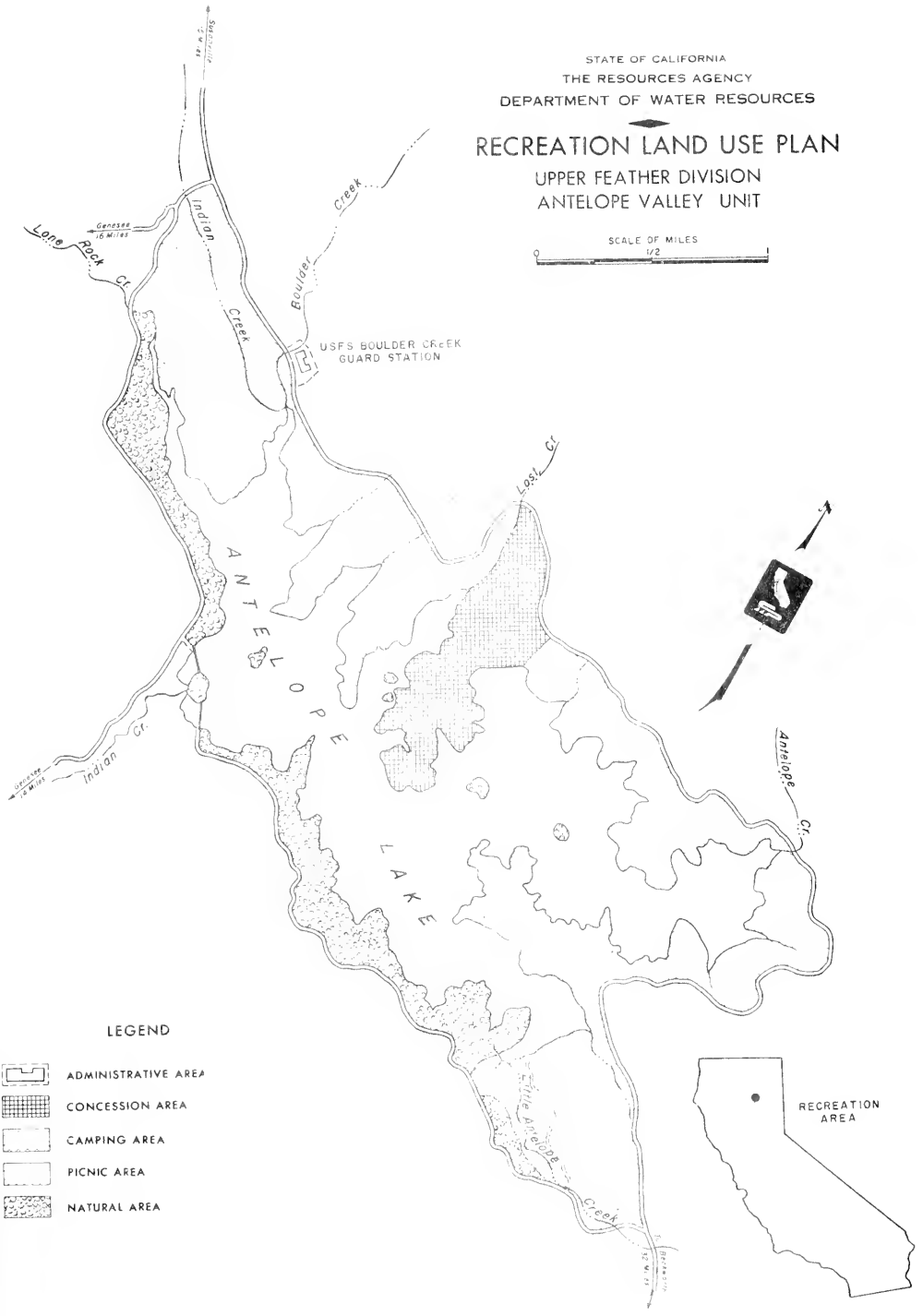
UPPER FEATHER DIVISION
FRENCHMAN UNIT

SCALE OF MILES
0 1/2

LEGEND

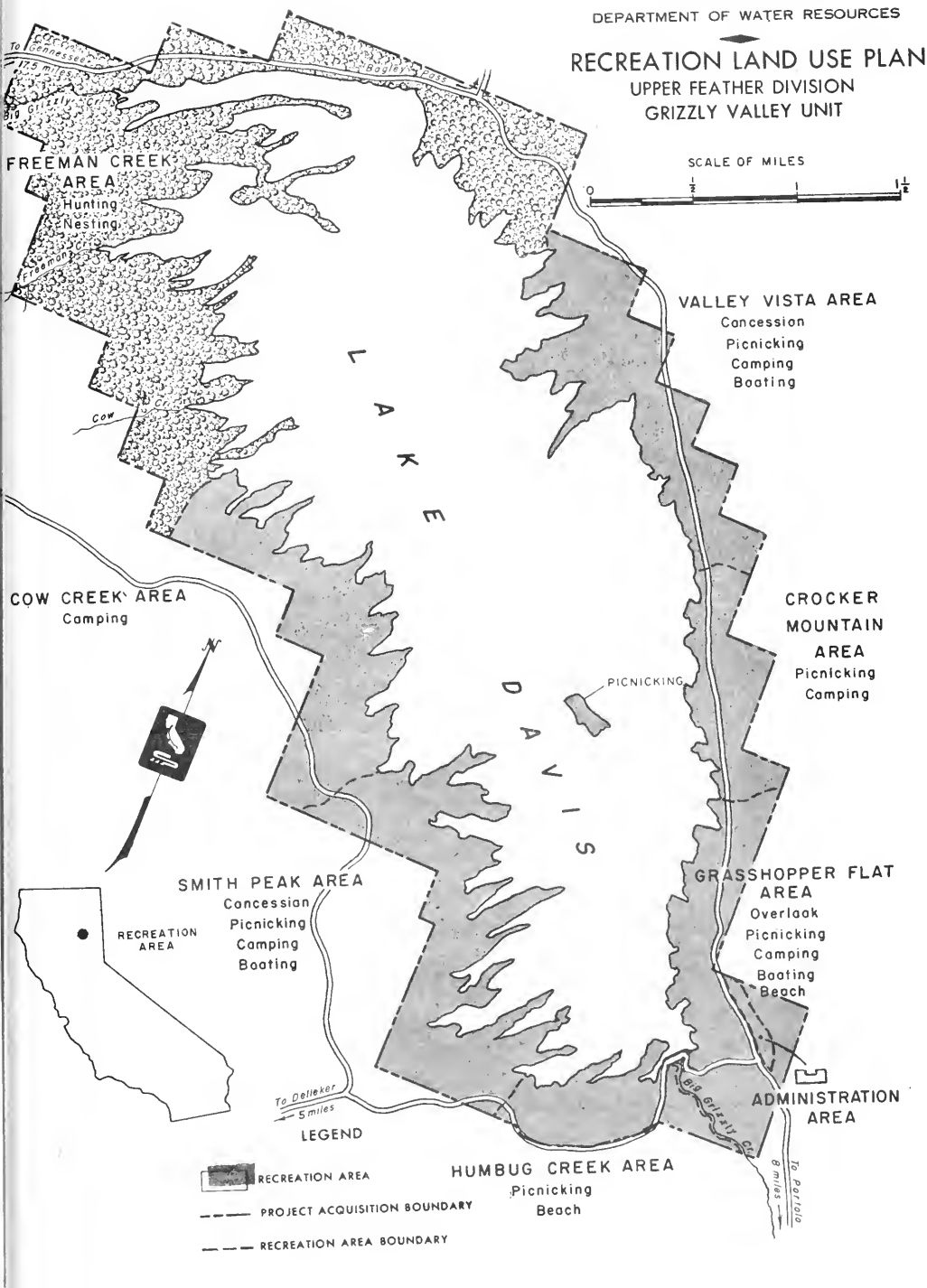
- ADMINISTRATIVE AREA
- CONCESSION AREA
- CAMPING AREA
- PICNIC AREA
- NATURAL AREA
- BOAT LAUNCHING AREA
- PROJECT ACQUISITION BOUNDARY
- (G) Group Area

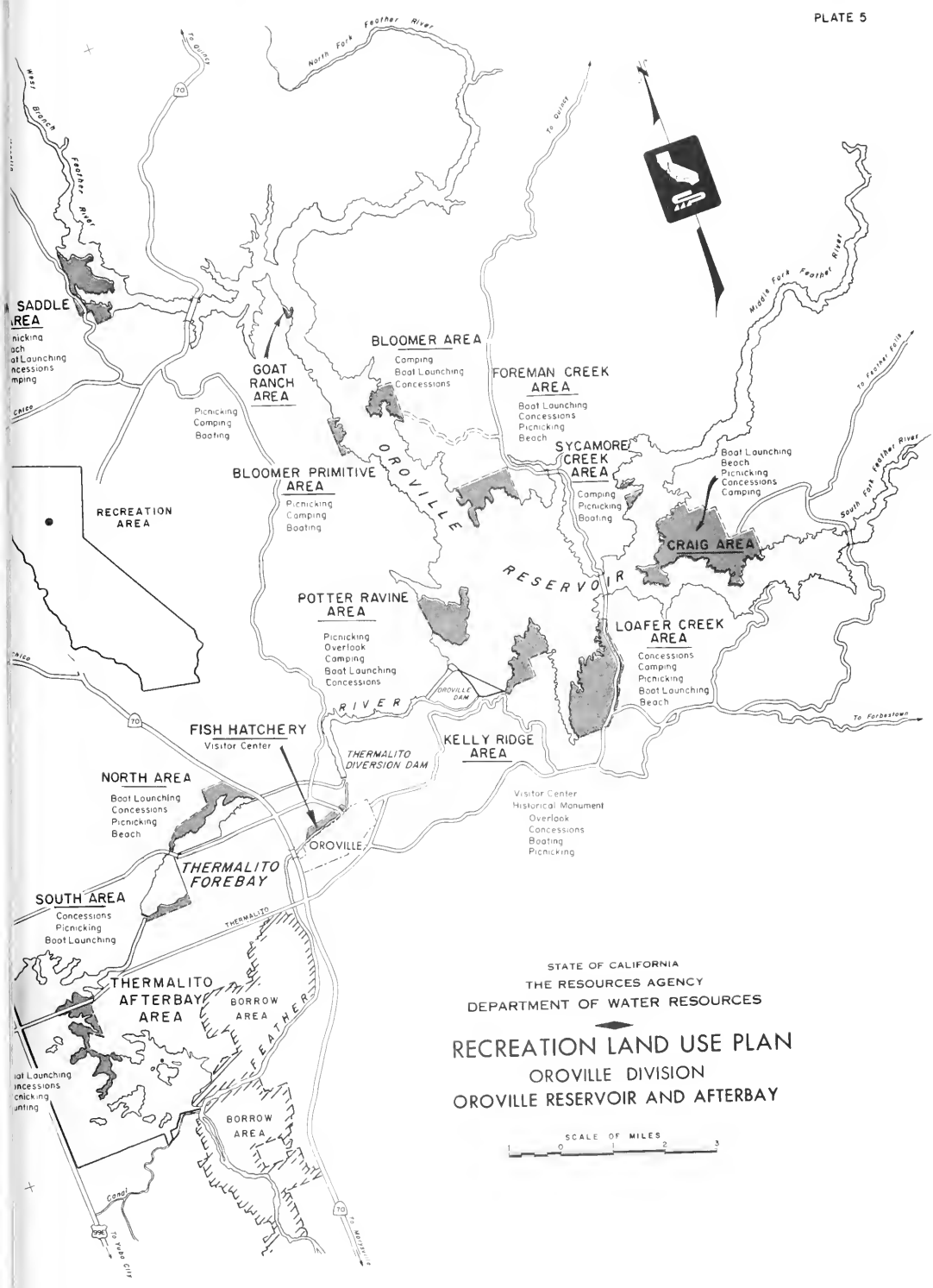



STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
RECREATION LAND USE PLAN
UPPER FEATHER DIVISION
ANTELOPE VALLEY UNIT
SCALE OF MILES
1/2
0
Genesee 16 Miles
Lone Rock Cr.
Indian Creek
Boulder Creek
USFS BOULDER CREEK GUARD STATION
Lost Cr.
ANTELOPE LAKE
Indian Cr.
Genesee 14 Miles
Antelope Cr.
White Antelope Creek
LEGEND
ADMINISTRATIVE AREA
CONCESSION AREA
CAMPING AREA
PICNIC AREA
NATURAL AREA
RECREATION AREA

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

RECREATION LAND USE PLAN
UPPER FEATHER DIVISION
GRIZZLY VALLEY UNIT

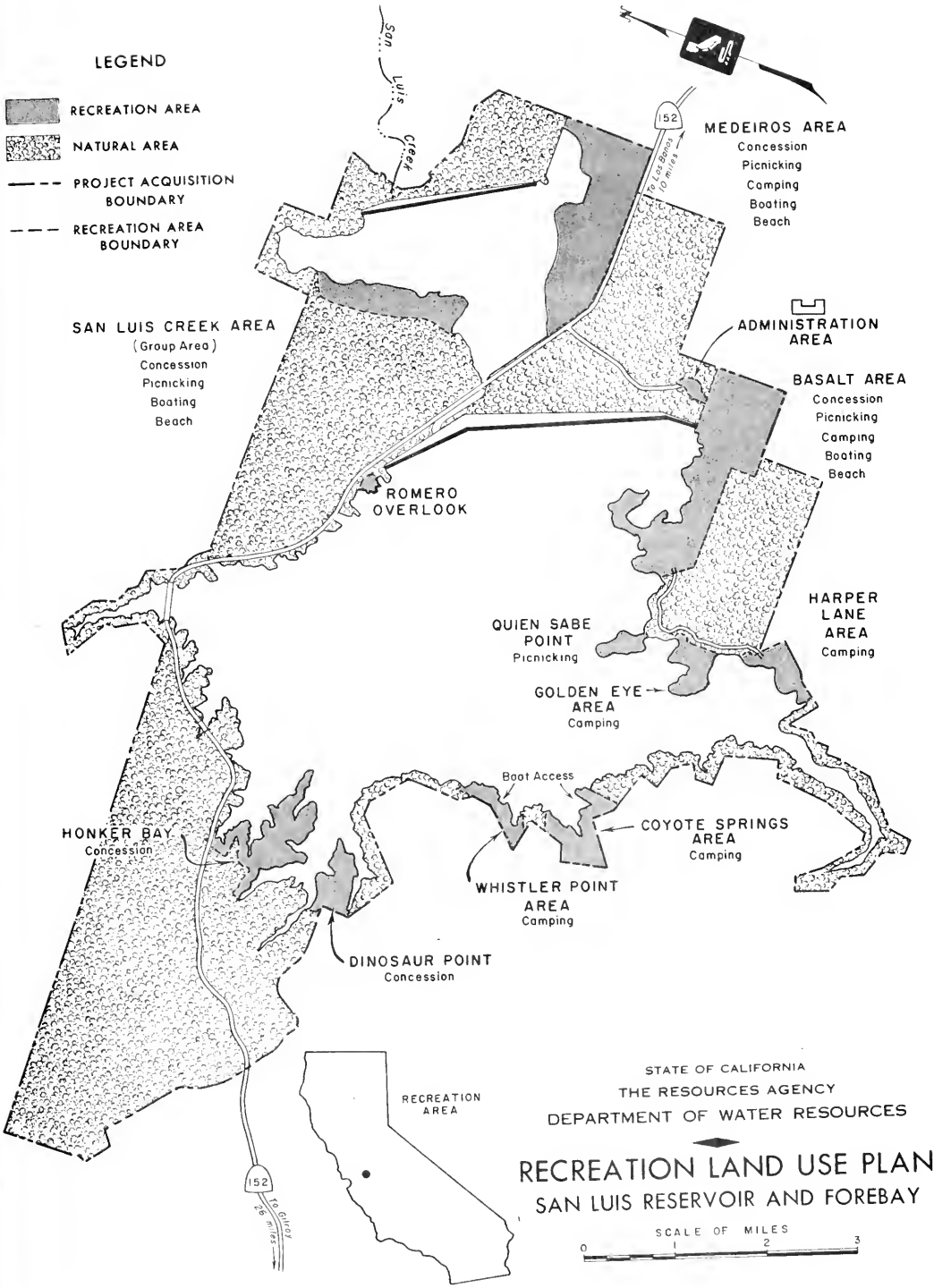




STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

RECREATION LAND USE PLAN
OROVILLE DIVISION
OROVILLE RESERVOIR AND AFTERBAY

SCALE OF MILES
0 1 2 3

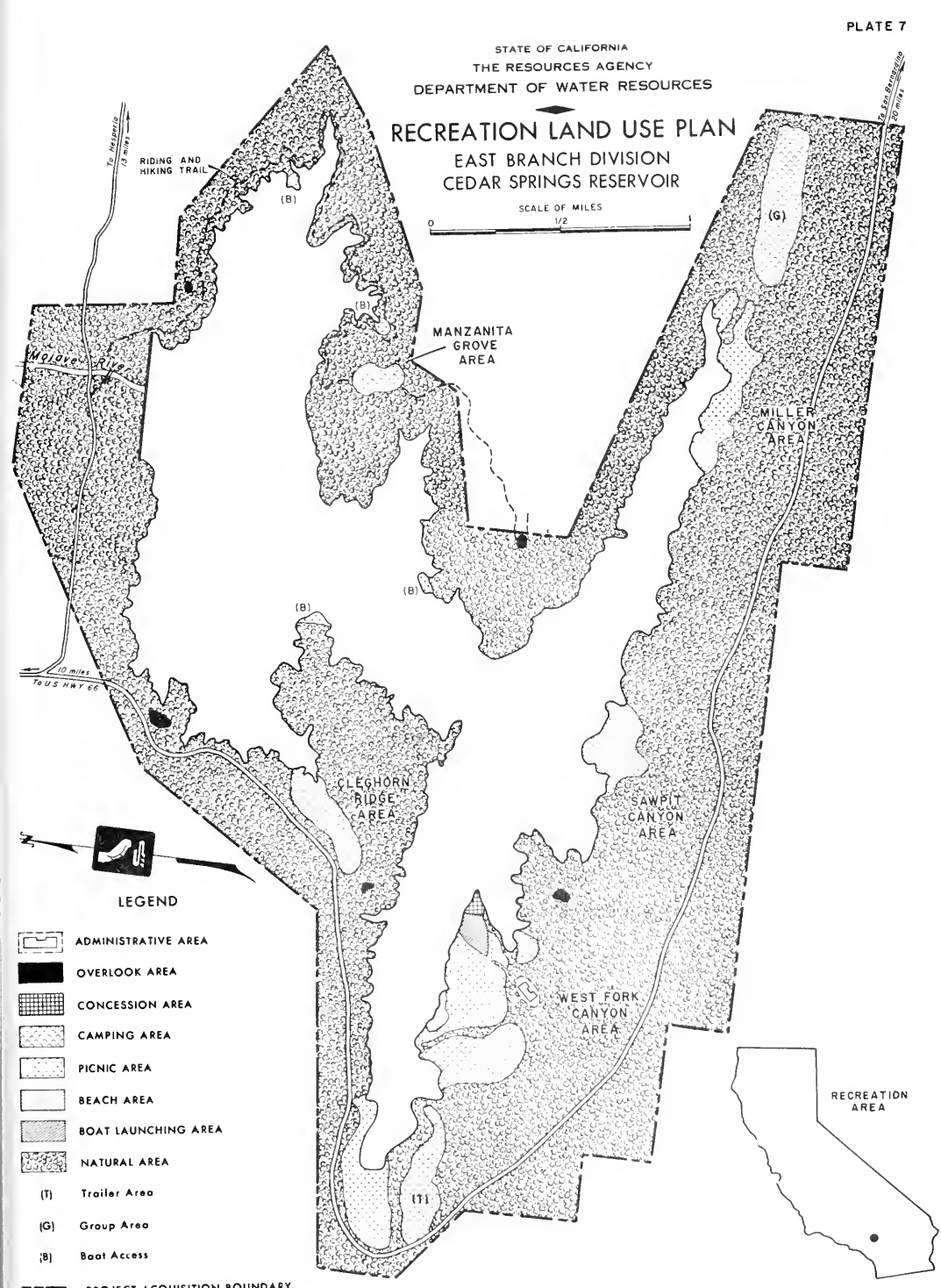

LEGEND
RECREATION AREA
NATURAL AREA
PROJECT ACQUISITION BOUNDARY
RECREATION AREA BOUNDARY
San Luis Creek
152
To Los Banos 10 miles
MEDEIROS AREA
Concession
Picnicking
Camping
Boating
Beach
ADMINISTRATION AREA
SAN LUIS CREEK AREA
(Group Area)
Concession
Picnicking
Boating
Beach
BASALT AREA
Concession
Picnicking
Camping
Boating
Beach
ROMERO OVERLOOK
HARPER LANE AREA
Camping
QUIEN SABE POINT
Picnicking
GOLDEN EYE AREA
Camping
Boat Access
COYOTE SPRINGS AREA
Camping
WHISTLER POINT AREA
Camping
HONKER BAY
Concession
DINOSAUR POINT
Concession
RECREATION AREA
152
To Gilroy 26 miles
STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
RECREATION LAND USE PLAN
SAN LUIS RESERVOIR AND FOREBAY
SCALE OF MILES
0
1
2
3

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

RECREATION LAND USE PLAN

EAST BRANCH DIVISION
CEDAR SPRINGS RESERVOIR

SCALE OF MILES
0 1/2 1

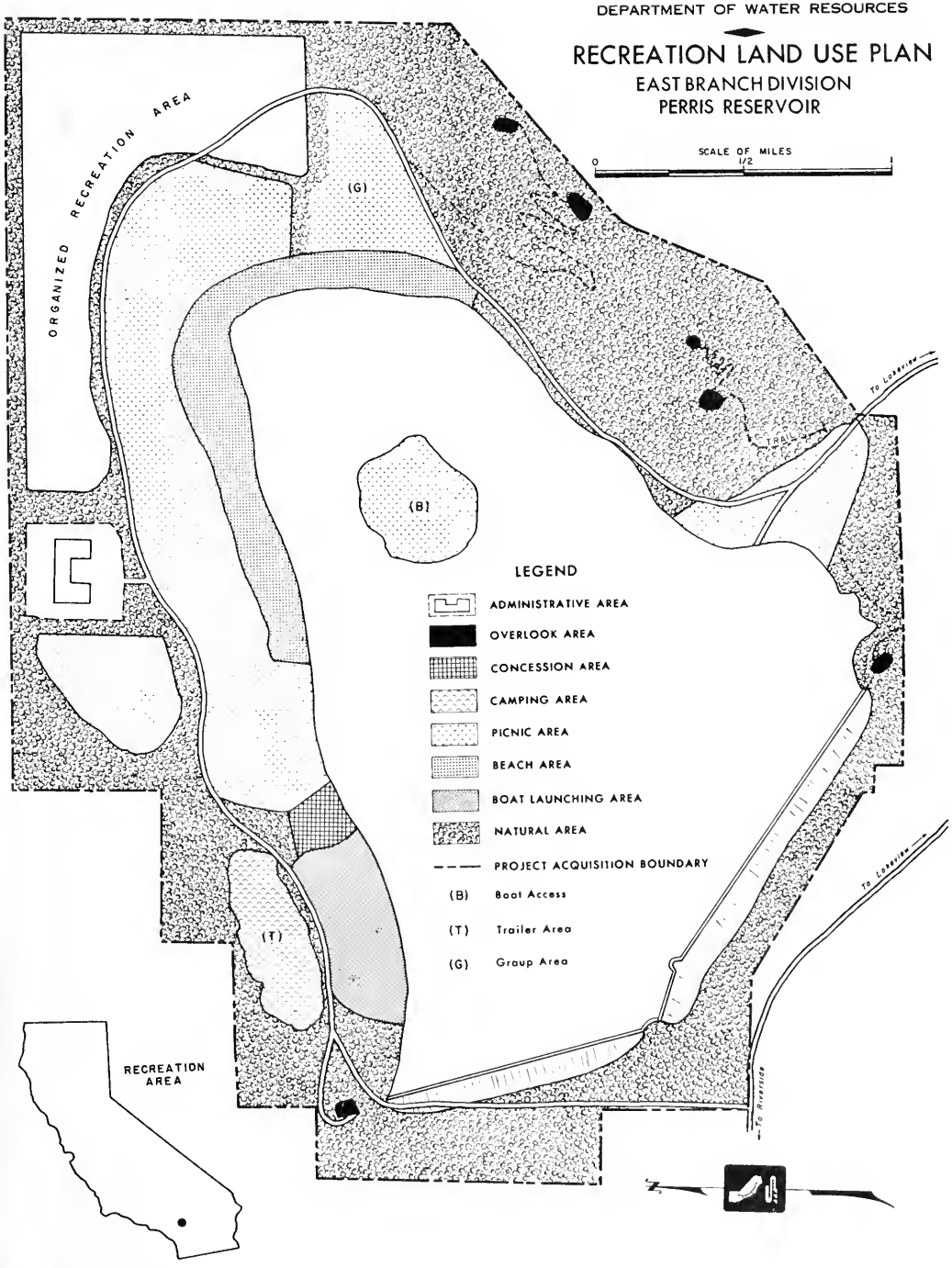


LEGEND

- ADMINISTRATIVE AREA
- OVERLOOK AREA
- CONCESSION AREA
- CAMPING AREA
- PICNIC AREA
- BEACH AREA
- BOAT LAUNCHING AREA
- NATURAL AREA
- (T) Trailer Area
- (G) Group Area
- (B) Boat Access
- PROJECT ACQUISITION BOUNDARY

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

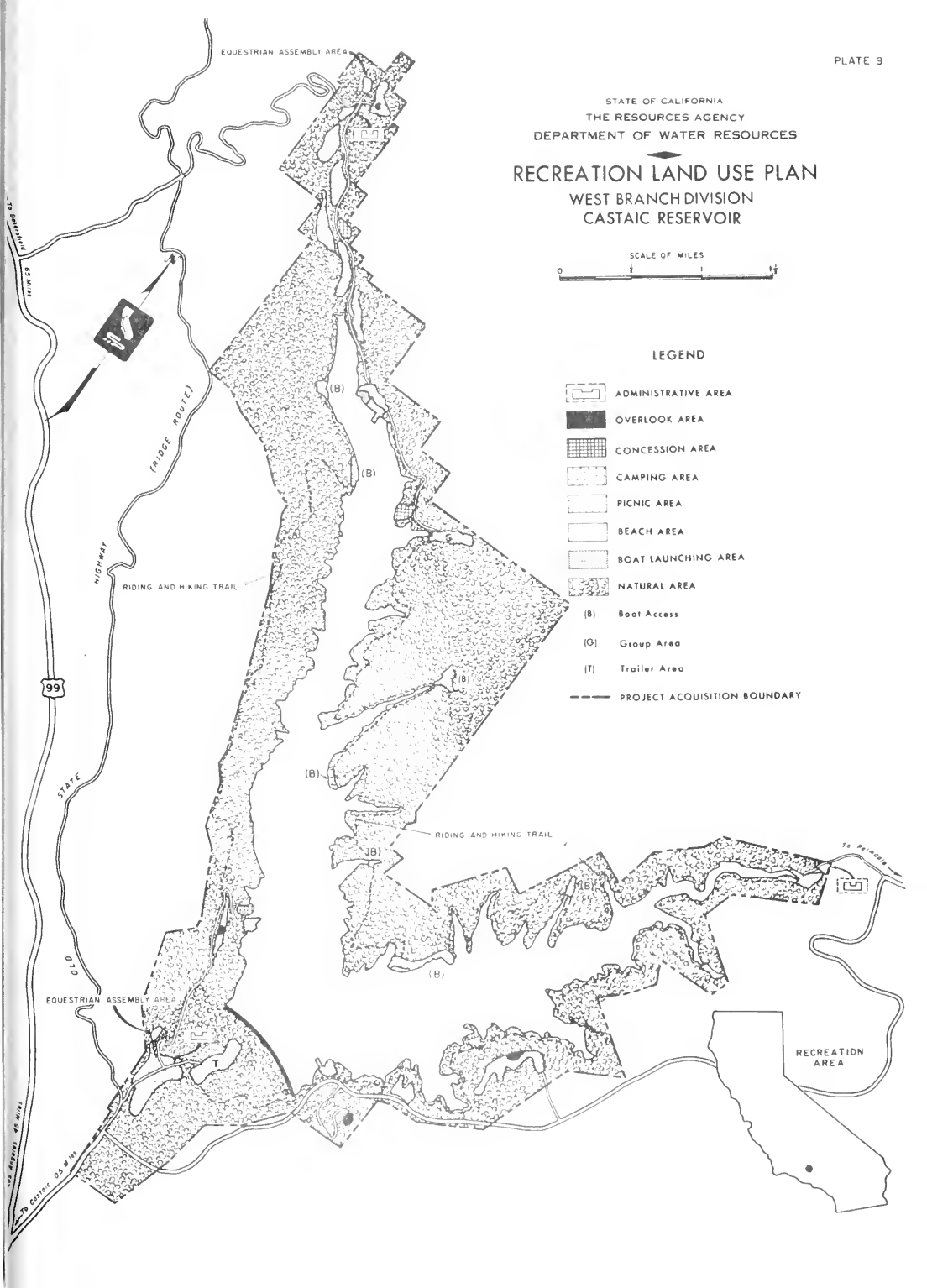
RECREATION LAND USE PLAN
EAST BRANCH DIVISION
PERRIS RESERVOIR

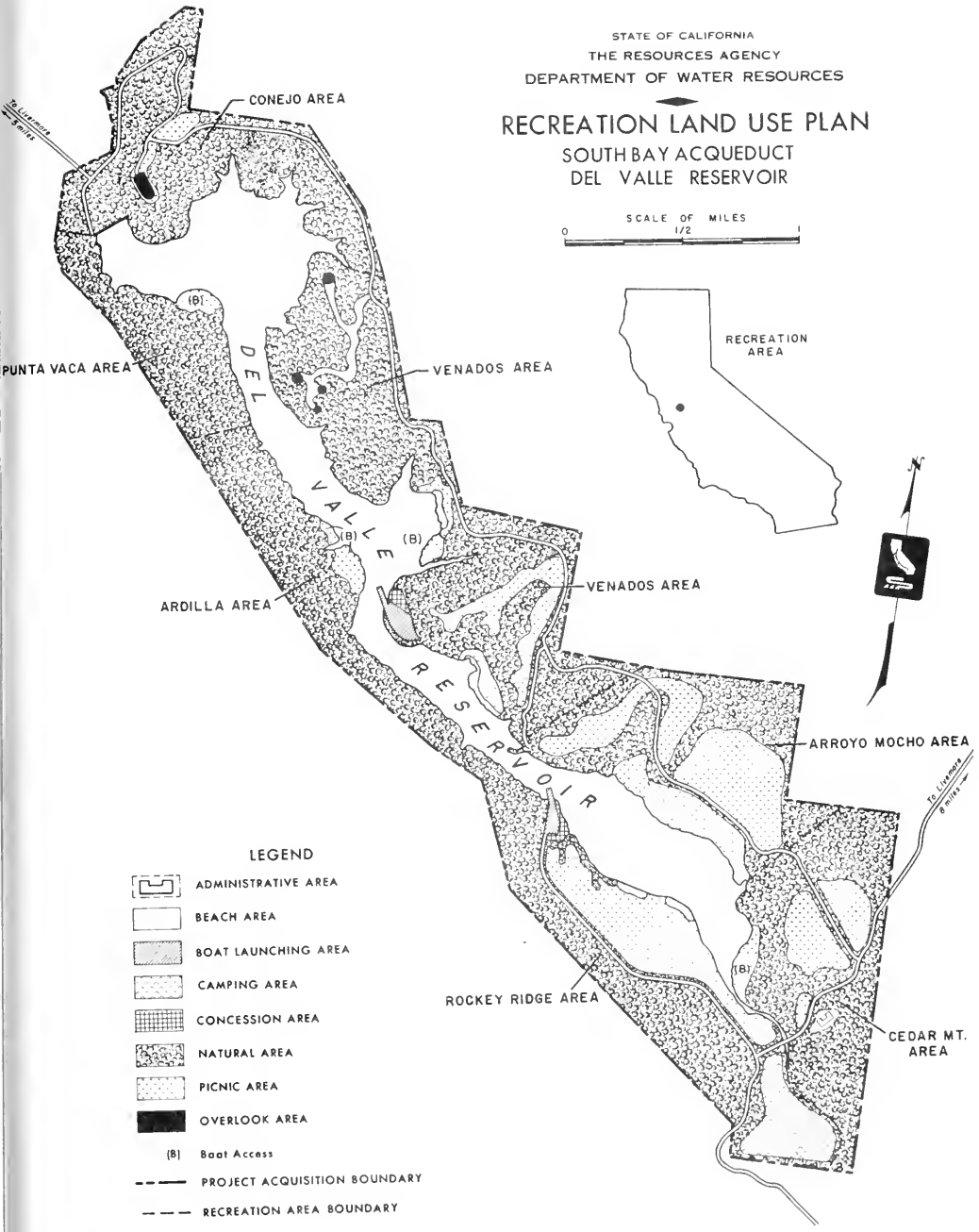


STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

RECREATION LAND USE PLAN

WEST BRANCH DIVISION
CASTAIC RESERVOIR




STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
RECREATION LAND USE PLAN
SOUTH BAY ACQUEDUCT
DEL VALLE RESERVOIR
SCALE OF MILES
0 1/2 1
RECREATION AREA
CONEJO AREA
To Livermore 9 miles
PUNTA VACA AREA
VENADOS AREA
ARDILLA AREA
VENADOS AREA
ARROYO MOCHO AREA
To Livermore 8 miles
ROCKEY RIDGE AREA
CEDAR MT. AREA
DEL VALLE RESERVOIR
(B) Boat Access
LEGEND
ADMINISTRATIVE AREA
BEACH AREA
BOAT LAUNCHING AREA
CAMPING AREA
CONCESSION AREA
NATURAL AREA
PICNIC AREA
OVERLOOK AREA
(B) Boat Access
PROJECT ACQUISITION BOUNDARY
RECREATION AREA BOUNDARY

THIS BOOK IS DUE ON THE LAST DATE
STAMPED BELOW

RENEWED BOOKS ARE SUBJECT TO IMMEDIATE
RECALL

OCT 12 1978
NOV 15 REC'D

UCD LIBRARY
DUE JAN 6
JAN 6 1971
JAN 14 1971
UCD LIBRARY
DUE JAN 5 1972

UCD LIBRARY
DUE JUN 5 1973

LIBRARY, UNIVERSITY OF CALIFORNIA, DAVIS

Book Slip–50m-12,'64(F772s4)458

UNIVERSITY OF CALIFORNIA DAVIS
3 1175 02468 7207

381810

TC424
Calif. Dept. of Water C2
Resources. A2
Bulletin. no.153:65

PHYSICAL
SCIENCES
LIBRARY

LIBRARY
UNIVERSITY OF CALIFORNIA
DAVIS